

SUPPLEMENT.

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FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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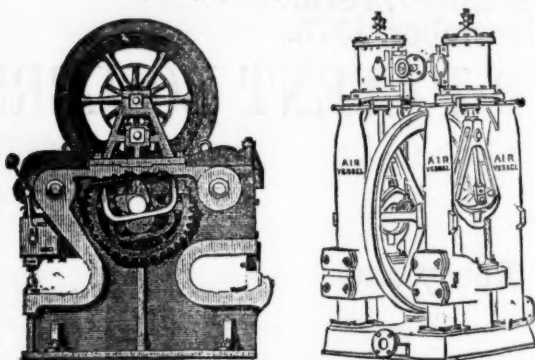


No. 2051.—VOL. XLIV.

LONDON, SATURDAY, DECEMBER 12, 1874.

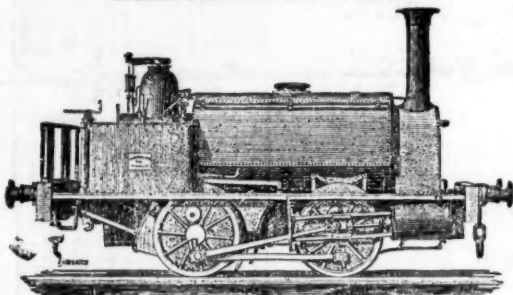
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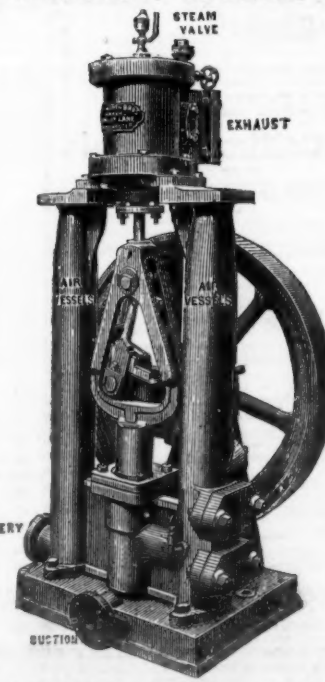
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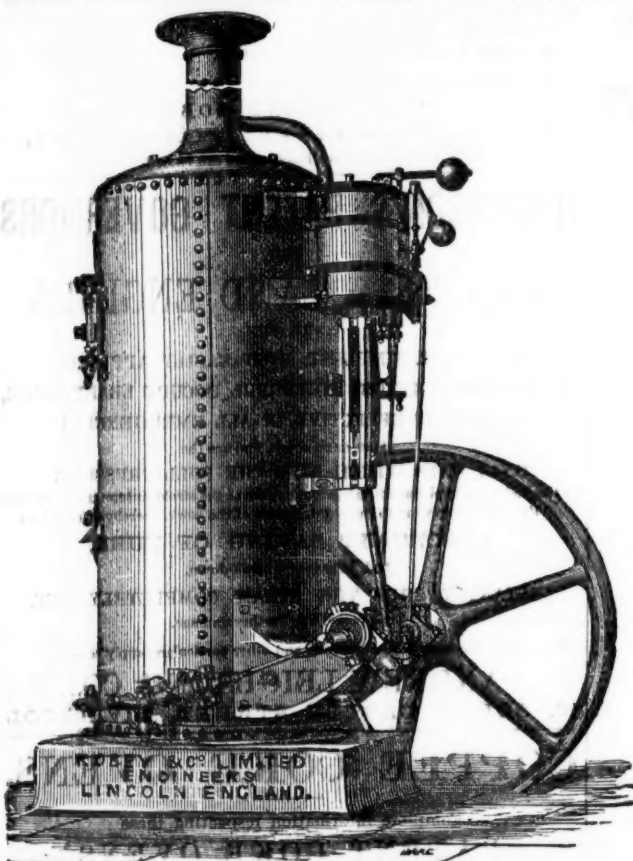
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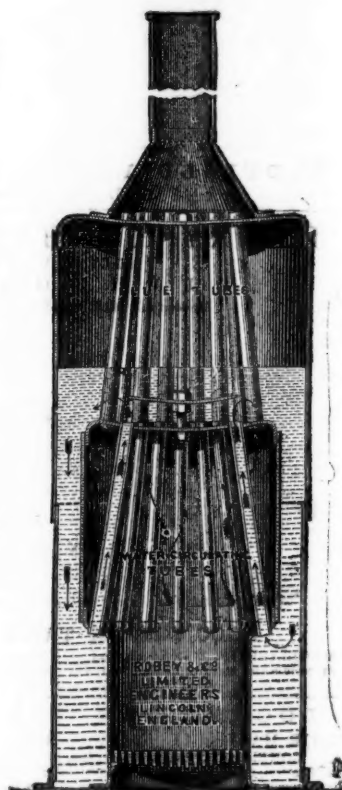
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Original Correspondence.

CO-OPERATIVE COLLIERIES.

Sir,—The problem whether collieries can be worked on the co-operative principle is now in a fair way for solution. There are now at least half-a-dozen companies, or rather societies, formed by working miners, the sole object of which is to try the experiment. These are—the Co-operative Mining Society of Newcastle, the Manchester Coal Mining Society, the Leeds, Morley, and District Mining Society, the South Buckley (Cheshire) Colliery, the North Staffordshire Co-operative Mining Company, and Henry Briggs and Son, of Methley, near Normanton. In the case of the Methley Collieries, they are owned by Messrs. Briggs and Son, who have, however, adopted the co-operative principle, taking only from the profits a percentage fixed beforehand upon the capital, and dividing the residue amongst themselves, their workmen, and their customers. The effect of this arrangement has been to obtain for them a market for the whole of their output amongst the surrounding distributive stores. A recent visit to the great co-operative centres of the North has yielded a good deal of information on this movement as regards coal and iron mining. The working men of the North have discovered that if, as the political economists say, capital is useless without labour, so labour is impotent for any great enterprise without capital, and they have devoted their savings to supply the requisite capital. Their own deposits have been largely supplemented by loans from the co-operative stores, which in the populous towns and villages have in a great number of instances accumulated from profits far more capital than is needful for their trade. At the present moment, therefore, it is not capital that is wanting, but the acquisition of suitable collieries or ironstone mines for its employment. Several causes have increased this difficulty. In some cases the prejudices of proprietors against co-operation have intervened. The extremely high prices obtained for coal, which to some extent suggested to the leading minds amongst the co-operators this field for the development of their energies, has naturally enhanced the first cost of coal fields, of shafts, and of plant; and the managers of the infant companies have been unwilling to overweight their speculations by paying too much for leases or royalties. This difficulty has been surmounted in most cases, and notably by the Co-operative Mining Society of Newcastle. This body started into existence, as it were, with a stamp of the foot. A number of delegates from the Northumbrian miners had assembled at Newcastle to discuss some questions respecting the strikes going on in the autumn of 1872; and having disposed of the points immediately referred to then, an informal conversation arose, in which it was suggested to form a coal mining society on the co-operative principle. There was doubtless a great deal of "tall talk" about colliers being their own employers, and working in their own mines, but the idea took a practical shape, and in a very short time afterwards the prospectuses were issued, 1200 shares taken, and £1 deposit on each was paid down. At the present moment there are double that number of members who are working miners. After a time the new society obtained a lease of the Monkwood Collieries, near Chesterfield; sufficient additional capital was furnished chiefly by the other co-operative organisations, the Durham co-operators alone investing 15,000*l.* in the venture, and the work was commenced on a purely co-operative system. In the first place, it is indispensable that every person employed must be a shareholder, and so have a direct interest as a capitalist in its success. If anyone is not in that position previously he must become so by consenting to the deduction of a portion of his wages every pay-day to grow into share capital. The work itself is conducted just like any other well-ordered colliery in the district. There are the chief viewer, the under viewer and overman, the fireman, the hevers, putters, and so on below; and at the surface the ordinary bankmen, screeners, engineers, clerks, and business managers. The seam is about 4 ft. thick, the coal is what is called Silkstone of a good quality, and presents no peculiar difficulties. It is too fiery for the use of open lights, but beyond the ordinary safety-lamps no special devices to secure safety have been adopted.

After paying all the working expenses, interest on borrowed capital, and writing off a sufficient amount for depreciation and insurance, the profits are divided into three parts. First, the shareholders get 10 per cent. on their capital; the remainder is divided between the workers and the customers. The shareholders may, if they please, take their percentage; but it is found that most of them allow it to remain to increase their number of shares. The work-people (whether full shareholders or not) must leave their portion of the surplus to become capital in addition to the deductions from their wages, which go in the same way. The customers, in the first instance, are the co-operative distributive societies, but the real customers are the consumers; and in order to let the latter obtain their share of the profits, all purchasers get back again so much for every ton purchased. This, it may be said, is discount under another name; but it is not taken off the price of the coal, which follows the ordinary markets, and is paid like a bank dividend at fixed periods. One reason given for adhering to this arrangement is the hope that many of the customers will leave their dividends to accumulate, and thus to become capital—a result very largely experienced in the purely distributive departments.

Amongst the other societies, we hear of the South Yorkshire having 5000 members, with 1*l.* a share paid up; and of the Leeds and district society 10,000 members. The former is about getting to work on the Barnsley coal beds; and the latter has not only a colliery near Leeds, but has invested largely in a mine at Tipton. Some of the sums mentioned as being at the disposal of the working men are startlingly large, but the wonder ceases when it is remembered that the disposable net profits realised last year by the co-operative stores was 807,000*l.*; and that in one town the accumulation of capital beyond the amount required to carry on the business had become no less than 7000*l.*, which, after due notice, the owners were required to withdraw, and which they would naturally invest in co-operative undertakings.

Now that co-operative collieries are multiplying in number, schemes are under discussion for some sort of federation which would prevent them competing with each other in the attainment of mines or pits, and some sort of combination between the working miners and the co-operative stores will shortly be completed.

One of the most important results expected from co-operative production is that it will put an end to strikes. In all disputes between capital and labour there is wanted some recognised standard by which fair work and a fair rate of wages can be decided. Thus, when collieries and cotton mills, and other branches of industry, are carried out by co-operation, that standard will be obtained. Whether it will be generally recognised or not is another question. When the workmen find not only the labour but the capital, then other workmen may be convinced that the rewards of each are fairly adjusted. Certainly all the working men who become co-operators are certain sooner or later to discard the theories which would give undue preference to labour, and be ready to admit the claims of capital derived from their own thrift and past labours. In short, the conflicting interests of capital and labour will not be represented by different persons. The masters in other establishments can appeal to the co-operative works as to what is the fair rate of wages. Differences will, at any rate, be more easily accommodated when the employer can refer to a rate of wages not determined arbitrarily by the capitalist class, but by workmen who are capitalists themselves as well as workers.

In the meantime no direct results with respect to strikes are likely to result at present from this movement. The workmen at the Monkwood Collieries agree not only to the fiscal arrangements, but bind themselves not to strike. The agreement is that in case of a general strike the work at Monkwood goes on as usual, and when the strike is ended the workmen have an advance if it be gained, dating from the commencement of the strike; or supposing the contest to result in a fall of wages the workmen accept the new rate of the district. Dr. Rutherford, of Newcastle, an active and educated supporter of co-operation, is sanguine that the recognition of labour, which is an essential principle in it, will gradually extinguish strikes, that it will stimulate men to do their best instead of dawdling through the hours of labour, and that it means good, honest, manly work. And

certainly, whether produced by co-operation or any other agency, that is "a consummation devoutly to be wished." C.

A MINERS' AGENT ON CO-OPERATIVE COLLIERIES.

Mr. WILLIAM BROWN, of Hanley (the North Staffordshire miners agent), on Tuesday, addressed a meeting of miners at Bedworth on the subject of co-operative collieries. Mr. Brown said he had for many years been convinced that if ever the working men of this country were to raise themselves above the level of ordinary workmen it would have to be done by co-operation. Those present were, no doubt, aware that the miners in West Yorkshire and North Staffordshire had formed a Mining and Building Society (Limited). They intended to work their own pits, get their own coal, take it to the market, and sell it to customers, thus earning for themselves something more than ordinary wages. They had been told many times by employers that they were obliged to have large profits, in order to put by annually a surplus capital, to enable them to extend their works, and meet the requirements of an increasing population. He thought the capitalists now in existence had amongst them capital enough and power enough; and if working men, without taking anything from the capitalists which they had already got, could just have confidence amongst themselves, and manliness enough amongst themselves, and could bring their minds to endure a little self-denial for a season, in order to work out for themselves a permanent future good, he was confidently of opinion that that would be the first step for the advancement of the working classes of this country. Unfortunately, every working man could not be made to see that it was right to have a co-operative colliery, and while many of them spent in other things as much as would enable them to pay for two or three shares they could not find manliness enough to take a few shares. The 1500*l.* which in his district had been paid as a deposit on a colliery had been contributed by working men alone. The Longton lodge had taken 100 shares, Burslem 50, Hanley 70, while a number of other lodges had taken, some 50, some 40, and others 30. There were, in his district, individuals who had each 10, 15, and even 20 shares, and had paid them up. Surely a small sprinkling could be found in Bedworth who were favourable to the co-operative principle. The colliery which had been purchased by the miners of his district would be a paying one. There were eight seams of coal, and the colliery was not more than 450 yards from the railway. They knew the coal was good in quality, and abundant in quantity. In Macclesfield, which was about 18 or 20 miles from the colliery, there was a coal company whose object was to distribute coal, and not to produce it. That company had sent them a cheque to take up 100 shares, and if they required any further assistance that company was willing to take up 100 or 200 more shares. When a coal-consuming company like that sent money to enable them to open up their pits they might depend upon it that as soon as they had coal to offer they would become customers. He had also been in communication with another large co-operative coal company, of which Mr. Thomas Hughes was Chairman—a company which was now doing business in coal distribution to the extent of 4000*l.* per month, and they were waiting for them to open their pits, and as soon as they were ready to offer coal the company was ready to try and make a bargain with them. Consequently, they would have no difficulty in disposing of their coal, though they would have to get it before they could offer it. He had not come there to blow up a bubble and to float the scheme, for if he wanted to float it he could do so in Hanley, Burslem, Longton, and Tunstall. They had not selected a capitalist to take up a single share, as they wanted working men to have the benefit of the shares; but two gentlemen with capital had voluntarily agreed to take up 250 shares each, while a respectable working man, who was a practical miner, had promised to take up 100 shares. They wanted the working colliers of the other districts and lodges, and out of a private little fund, to begin and work the colliery themselves, in order that it might be proved to demonstration that there was manliness enough, desire enough, intellect enough, rectitude enough, and perseverance enough in the working colliers of this country to work and manage collieries of their own. (Applause.)

GOVERNMENT INSPECTION OF COLLIERIES.

Sir,—The reports of the Government Inspectors, of which you published an abstract in last week's Journal, contain much interesting information apart from that of a strictly official character; and as two or three questions are raised which are well worthy of consideration, I must ask you to permit me to call attention to them. With regard to certificated managers, for example, there appears to be some doubt after all whether the effect of the Act will not be prejudicial to workmen, to employers, and to managers themselves, and at the same time fail to add anything to the safety of the collieries. For instance, the Inspector for the Northumberland district (Mr. James Willis) states that the clauses relating to certificated managers have given rise to great dissatisfaction amongst certain of the officials connected with the management of the mines in his district; and, judging from the correspondence columns of some of the newspapers more especially devoted to mining, these clauses have not been without similar results in other districts. The result in this district of the varied renderings of the clauses, together with the regulations and instructions issued from the Home Office from time to time, has been that the person (or officer) universally appointed manager is, in his opinion, not a manager at all, has no real control, and ought not to be responsible as manager. However, as stated above, it is perhaps too early to criticise the working of a new Act, and he is glad to be able to speak with confidence of the earnest endeavours of all parties concerned, owners, officials, and workmen, to comply with its provisions. Now, this is really a very difficult matter, and perhaps the more so because there appears to be no readily available remedy. The system of having certificated managers was essentially a working man's measure, so that working colliers cannot consistently ask for the repeal of the clause, the managers cannot do so without creating the opinion that they feel themselves incompetent to pass the examinations, and the owners can do nothing without running the risk of being charged with sinister motives.

Referring to explosions, Mr. Lionel Brough very reasonably credits the statement so often made of sudden outbursts of gas, and observes that it is too often suggested that the cause of a calamity is anything, in fact, except the true cause—insufficient ventilation. As to gas, he says the only approach to a "Palladium" is fresh air sweeping throughout the workings, cooling down all the pit, mixing itself up also with emanations in such manner as to render harmless every noxious thing in the colliery. But these desiderata cannot be arrived at unless the shafts from surface to bottom, and every gallery in the mine as well, be of adequate sectional area, accompanied with vast ventilating power. In connection with this subject, he adds that strange theories have been surmised, more especially as regards shot firing. One is the sudden exudation of gas from fresh coal faces by reason of vibratory action; or, again, vacuum following detonation, thus causing fire-damp to rush out of the solid coal. He believes these views to be altogether untenable. Most likely gas was already liberated, and the ventilation was faint. Fire-damp will sometimes secrete itself where the deputy's careless safety-lamp has never penetrated; then, perhaps, a chance shot is fired, and is followed by an explosion of carburetted hydrogen; flame from some of these shots is often very far reaching indeed. In coal mines where powder is used plenty of firemen and a searching scrutiny all round about with the Davy before the shot is fired is the nearest approach to safety. With our present amount of knowledge it is evident that safety-lamps cannot yet be dispensed with—perhaps never will. But, in the course of time, human ingenuity will possibly lead to great improvement in them, but we cannot allow those we possess to be superseded except by one of universally acknowledged superiority. Much real ability has been exhibited in the invention of apparatus to prevent the surreptitious opening of locked lamps, but he is impressed with the opinion that the employment of strictable sub-officers, and of respectable trustworthy workmen, will be found to be the best way to keep the lamps locked, better than even the most ingenious mechanical process yet discovered.

The diminution in the number of casualties in Mr. Baker's (South Staffordshire) district is very remarkable. He remarks that the

results of a single year in a matter so fluctuating as mining accidents cannot be depended upon, but the steady and striking decrease in the loss of life in this district during the whole period in which protective legislation has been applied to coal mines cannot but be regarded as a most gratifying result of the measures taken to diminish the hazard of the miner's occupation. In no year during that long interval have so few lives been lost in this coal field as in 1873, and the average has been steadily declining. For the first 10 years of inspection the average was 162, and for the next 10 years, ending 1870, it was 107, whilst for the three subsequent years it is only 88. In no mining district was the interference of the Legislature more needed than in South Staffordshire; and in none has it proved more beneficial, and facts given above clearly show that by proper care the working of mines may be rendered far less dangerous to life, and give good ground to hope that further improvement may be secured. In spite of the comparatively favourable results 1873 shows, I am satisfied, that the death-rate would have been still lower had the mining operations been in all cases directed with even an ordinary amount of skill and care.

The mixed use of safety-lamps and candles has frequently been condemned in the *Mining Journal*, both editorially and by correspondents, and an additional evidence of the danger is given by Mr. Wardell, who mentions that one more proof of the dangerous system of mixing safety-lamps with candles in a fiery seam occurred at Willow Bank Colliery on Oct. 10. Joseph Beckett, a miner, was on that morning at work in a shaft bord, and when he began at six o'clock he had a safety-lamp, his hurrier, who hurried to within a few yards of him, having a candle. The place was in the neighbourhood of some faults, and when the deputy visited it that morning he found a little gas on the top; he then ordered Beckett to put a slit through in order to ventilate the bord, and told him when he holed he, the deputy, was to be informed. The man, however, seems to have lighted a candle after a time, and a shot which was fired in the vicinity disturbed the gas, which ignited at the open light, and so burnt Beckett as to cause his death. The arrangement which gives a man an opportunity of changing his lamp for a candle is one to which Mr. Wardell has always strongly objected.

The sudden outburst of gas in such quantity as to jeopardise the entire mine, provided the mine be ordinarily ventilated, has frequently been denied by practical men, and there is really few well authenticated cases on record; indeed, I recollect but one, and from that no loss of life ensued. It was in Mr. Hedley's district I think, and there were about 300 men employed—all with locked safety-lamps. The outburst occurred and filled the pit in 10 or 15 minutes with gas, but as no naked light was exposed the men were all got out in safety. The use of mixed lights is absurd; if a pit be so foul as to require lamps in any part, naked lights should be rigorously excluded.—*Durham, Dec. 8.* H. J. C.

MACHINERY AS APPLIED TO THE UNDERGROUND WORKING OF MINES.

Sir,—Of vast importance is this subject to all those who are, however slightly, interested in mining, whether metallic or otherwise, for it must be evident to the casual observer as well as to the most astute thinker that at no distant period machinery must supersede labour by hand, at first, perhaps, in a small degree, but with a scope gradually widening and extending its bounds. It, therefore, behoves everyone not only to take a passive interest in the advancement of the utility of machinery, but also to give those who strive to adopt the machines to the obviating of manual labour every encouragement. Deep thought has been working, endeavouring to devise a simple, easily applicable, and adaptable machine for coal-cutting and rock-boring. Science has exhausted herself in researches and trials, but the difficulty has become more apparent as progress is made. Even as it was with inventors like Stephenson and Watt, at every turn they had to encounter ignorance, prejudice, and what not, but the time shall come, nor long remote, when not only will rock and coal be wrought by machinery more cheaply than by hand but more uniformly, and the work will be accomplished more satisfactorily in many ways. But though few desire to see these appliances introduced more than myself, I cannot shut my eyes to what meets me in every newspaper at each folio—I mean the item of cost. Machine work will never supersede manual until the cost of the former approximates or becomes even with the latter.

Although I have from time to time observed in the *Mining Journal* very interesting statistics regarding the rate of progress in the St. Gothard Tunnel, operating with dynamite, I think if those statistics were supplemented by statements of cost they would be not only more interesting and instructive but more encouraging. I fear, however, that the cost per fathom would not compare very favourably with that paid for hand-boring. This was the case with the Mont Cenis Tunnel; the cost per fathom was enormous, but as the company of contractors had 1,000,000 frs. for every year they gained on the time specified in the contract, in the long run they were the gainers. At that time boring machinery was in its infancy, and the machines were complicated; but with the modifications and improvements since introduced they have been remodelled, and the result now might be far different as to expense.

Some months ago some interesting particulars of a trial of boring machines appeared in the *Mining Journal*, stating that Mr. Döring had made a trial of his machine at Tincroft and Dolcoath. This was a mere experiment, and like most experiments was a failure. It was in many ways conducted under favourable circumstances. At Tincroft the level was driven 6 ft. x 6 ft.; consequently, at much greater expense, and the contractor, being paid less than the working miner, was forced to suspend his operations. At Dolcoath, too, the experiment failed, though from a different cause. Mr. Döring first laid down a 2-in. air-pipe, which was afterwards supplemented by a 3-in. one. The consequence of having two pipes of small diameter instead of one of larger size was evidenced by a great loss of power, through friction and other causes; therefore Mr. Döring could neither sink or drive as fast or as cheaply by machine-power as by hand labour, and was forced to give up the trial. But this was more than five years ago, and since then the improvements effected warrant a re-trial. I think Mr. Waddington should have at least fair play in the trial of the machine at Wheal Agar, and I can only hope he will publish returns of the amount of work done and the cost per fathom. The machine goes to work at a time when labour is cheap in Cornwall, and this may be viewed as a disadvantage by some; further investigation will show that idea to be a fallacy. The history of the boring machine is fraught with interest to all miners, especially Cornish, and we hail its introduction as the harbinger of increased prosperity, and wish the plucky introducer, Mr. Waddington, the boon which he doubtless desires and richly deserves—success. Coal-cutting machinery will form the subject of a subsequent letter.—*Dec. 7.* N. B.

ROCK-BORING MACHINE.

Sir,—In the article on the "Darlington Rock-Borer," which appeared in the Journal of Nov. 23, there is no criticism on any other boring machine now before the public. The point of chief interest to miners is not to what extent or in what way one boring machine may differ from another, but it is what means are necessary for expediting exploratory works, and how far can reliable boring machines be advantageously substituted for hand labour? In reference to the American "drills" known in England, I stated that each machine is characterised by different varieties of "striking-gear," and this I repeat is the case. I also remarked in some what technical language that no "self-contained" machine can strike the blow, and open the valve exhaust port after such blow is struck. Now, every borer known to me with a "maintained connection" between its reciprocating parts and the valve acts with an elastic blow, the piston being cushioned, by admitting the steam on one side and exhausting it on the other a moment or so before the blow is struck. With regard to the striking weight or cutting effect of a borer, it is evident that it must be in proportion to the combined weight and velocity of the piston to which it may be attached.

In the present state of the boring machine question in this country, mere schoolboy and noisy challenges will have but little weight with the thinking part of the mining public. A machine in constant request and duplicated nearly 500 times will for practical pur-

poses be regarded with greater favour than a mere holiday and illusory show of different bidders. Of the use of the Brydon, Davidson, and Warrington machine in Prussia I have no exact particulars, but it will be easy to obtain them. X.

ROCK-BORING MACHINERY.

SIR.—The following remarks appear in the Supplement to the Journal of Nov. 28, under the heading of Percussion Rock-Boring Machinery, in connection with the Darlington Rock-Drill:—

"The contrivance for rotating the drill was patented jointly by Jordan and Darlington many years ago, and since adopted by other makers, is inside the cylinder," &c. Allow us to observe, for the information of your readers generally, and especially for that of Messrs. Jordan and Darlington, that the Burleigh rock-drill specification, dated Nov. 22, 1866, No. 3065, describes in the clearest and most unequivocal manner the spiral rotating action for the drill or borer; and that Jordan and Darlington, in their specification, dated Nov. 29, 1867, merely repeated what had thus been already stated and secured. You can easily assure yourself of this fact by a reference to the official documents quoted. In conclusion, we must add that if such claims are made we shall feel ourselves, however reluctantly, bound to take action for the protection of our own interests. Please to favour us by inserting this explanation in your next issue. T. BROWN AND CO.

Newgate-street, London, Dec. 10.

ROCK-BORING MACHINERY—TREVITHICK.

SIR.—No name is better known in Cornwall than that of Trevithick, the illustrious engineer, a man who displayed extraordinary powers of mind and fertility of invention, the father of high-pressure steam-engines, and the contriver of numerous labour-saving machines—machines which have only been fully appreciated during the last 20 years, and which in many instances are associated with other names. In the "Life of Trevithick," written by his son, vol. ii., p. 23, is found the following passage:—

"Trevithick was equally ready with the application of steam power, either for pumping of water or for boring and removing rock. The use of chisels and rock (stone) breakers in the Thames, in 1808, had prepared the way for the more perfect engine for boring, lifting, and carrying rock from the quarries to its destination at the Plymouth Breakwater in 1812."

In a letter from Trevithick to Mr. Fox, jun., dated Camborne, Jan. 29, 1813, 61 years ago, he states—

"Since I was at Rockrow I have been making trials on boring lumps of Plymouth limestone, at Hayle Foundry, and find that I can bore holes five times as fast with a borer turned round than by a blow, or jumping down in the usual way, and the edge of the boring-bit was scarcely worn or injured by grinding against the stone, as might have been expected. I think the engine that is preparing for this purpose will bore ten holes of 2½ in. diameter 4 ft. deep per hour. Now, suppose the engine to stand on the top of the cliff, or any level surface, and a row of holes bored 4 ft. in from the edge of the cliff, 4 ft. deep, and about 12 in. from hole to hole, for the width of the piece to be brought down at one time, and wedges driven into the holes to split the rock in the same way as they cleave moorstone, only instead of holes 4 in. deep, which will cleave a moorstone rock 10 ft. deep when the holes are 14 or 15 inches apart, the holes in limestone must go as deep as you intend to cleave out each stone, otherwise the rock will cleave in an oblique direction, because detached moorstone rocks have nothing to hold them at the bottom, and split down the whole depth of the rock."

On Feb. 4, only six days later, he wrote again to Mr. R. Fox, jun.: "Since I was with you at Palmouth, I have made a trial of boring limestone, and find that the men will bore a hole 1½ in. in diameter and 1 in. deep in every minute, with a weight of 500 lbs. on the bit. I had no lump more than 12 in. deep, but to that depth I found that having a flat stem to the bit of the same width as the diameter of the hole, twisted like a screw, completely discharged the powdered limestone from the bottom of the hole without the least inconvenience."

From the foregoing statement, and extracts from Trevithick's letters, it is clear that the great Cornish engineer anticipated two of the chief points of later patented borers, such as drilling by means of pressure, and using a twisted tool. In May, 1814, Trevithick's rock-drilling machinery was delivered at the Plymouth limestone quarries, but the practical success of the invention does not appear to be recorded. X.

DIAMOND ROCK BORING.

SIR.—Can any of your readers inform me if there is any truth in the rumour that the American Diamond Rock Boring Company are about to open a branch establishment in this country? I remember seeing in print a remark made by Dr. Playfair to the effect that the English company had an undoubted patent right upon the system of boring by diamonds; but if this rumour be true, it would seem that their patent extends only to the machine. Competition is nearly always beneficial to the public, and the prestige the Americans have gained by their application and working of this system bodes well for any efforts they may make in this country. CARBON.

DOUBTFUL MINERALS.

SIR.—The other day, when I hastily chalked (*vide Chemical News*) on Mr. Lowe's back (*i.e.*, post-card), I didn't think that you would hold council with yourself over it. Feather me, stick me like a guy in the corner, and label me with the dubious adjective, "Archimedean." When I wrote my letter to the *Chemical News* about "Doubtful Minerals" I think "I was all there;" and if you pronounce *ex cathedra*, and the "all" not very much, you will find me Lutheran enough to retort—"God has given no man the ability to do much, in order that something might be left for every man to do." I don't think I used the term, but your rendering of it recalls to my mind two facts not at all in relation—the fact of having once had to pay a penny for a cane to be thrashed withal, and the famous sermon on MALT: M, my masters; A, all of you; L, leave off; T, tipping. I happen to be more of a follower of St. Wilfred; and this you may please to tell, A, all; R, your readers. But to business. I didn't in that letter, in thought, word, or deed, "jeer" at Maskelyne or Dana. I am under great scholarly obligations to the one, and I have too much sincere respect for both, to do anything of the kind. See what inconvenient vehicles of thought and fact words are, and in these "infirmary" and "anathema" days how much more necessary than ever it is to have clear and unmistakably pronounced "definitions." I am just fancying you picking up a stone at the corner of Chancery-lane, and finding out "somehow" that it is silicate of nickel, containing a little more water than usual, and, *ex cathedra*, pronouncing it *Minerjournaleite*. Do you think you could induce Maskelyne, Dana, Smyth, Forbes, Morris, Tennant, or anybody else to adopt your bantling? Yet such a thing to do wouldn't be half so meaningless as many similar acts of others I could cite.

You admit with me that "some of the present names of minerals are simply silly"—so far so good. You say, also—"Upon the whole you prefer Dana (to Maskelyne), because you believe his nomenclature more likely to be generally adopted." I do not. I prefer Maskelyne for many reasons; and I just like to hint in the most delicate manner in the world that your own faith in Dana is not shown in your works, or in your allocution you wouldn't have written copper glance and copper pyrites, but chalcocite and chalcopyrite instead thereof. Thus, like some theologians, you have mistaken Peter for Paul. Again, let me apply a test—Suppose next week, in your report of current sales of metallic ores, you eliminate such old-fashioned English names as lead ore, blende, black tin, and copper pyrites, and substitute Dana's *galenite*, *sphalerite*, *cassiterite*, and *chalcopyrite*. Do you think you could do it "without offending the popular prejudices of uneducated fellow-countrymen?" You couldn't. The mining world would "pitch" into you; and the professors in Jermyn-street, whose mineralogical knowledge and experience, in any case, are equal to Prof. Dana's, great as they are acknowledged to be, would have a jolly good laugh at you. In Jermyn-street the professors never think it a condescension when lecturing to speak expressive Saxon whenever it can be done, and this your own reports of Prof. Smyth's excellent mineralogical lectures fully testify. Another step:—You say that in chemistry "the close similarity of the nomenclature in the principal European languages has already been productive of great advantage, and it would be a matter for congratulation if similar uniformity could be secured in mineralogy." All this I steadfastly believe. You will also admit that without minerals there would be no mining, that without mining there would be no *Mining Journal*, and without a *Mining Journal* you couldn't occupy the Editorial chair. Admitting this much, and that the science of Mineralogy is at the bottom of it all, does it not occur to you to lend a hand yourself at making the language more uniform; or, as one might say, at sampling the nomenclature? Again, have you any objection to jolly Tars in general? A good deal of the

prestige of the country is due to them. Of course long ago you heard of one, "Lord Nelson." He was a Tar of the first water. Well, he and I were born at the same place, though not at the same time. I was on friendly terms with the officer of his ship who ran up the never-to-be-forgotten signal—"England expects every man to do his duty." I have also heard Brahm sing "Stand to your guns;" and my great desire is to stand by the latter, and discharge the former. No want of loyalty in this, I hope. Not open to expostulation, is it? But, chemically speaking, what do you say of tar? You write like a chemist. Tell me—Have you carefully analysed tar, or are you acquainted with those who have, or both? If so, you must very well know that (coal) tar has been made to yield more than half a hundred distinct substances, and that some of them are of marvellous use, and others of appreciated beauty. In the handling of tar or its products, then, dear Mr. Editor, be careful. Don't hit it hard with your Holtzapffel; it has no cleavage. It does not defile like pitch; it spatters and sticks.

But, dropping metaphor, what have I done more than, as Prof. Maskelyne says, in a "good humoured" way, attempted to draw attention to a very important but neglected subject? Please to recollect that philosophy in sport may sometimes become science in earnest, and that to work seriously at anything it doesn't necessarily imply that a fellow should have a face always as long as a fiddle, or to keep on the regular footpath or highway either. It is not clear to me that I should have succeeded in any other way. I owe my allegiance to this free country, and to no Pope whatever. I am jealous of the mineralogical honour of my countrymen. I am annoyed that we have to be taught by Transatlantic professors, whilst we have their equals at home. I resolutely take my stand at the British Museum. I have taken exception to only one word of Prof. Maskelyne's nomenclature—*caliate*, and that I don't care about. I have fired off one shot, and I mean to keep pegging away until I have accomplished my unselfish object, or until there is not another shot left in the locker. I have spent a good deal of money, and many hundreds of, perhaps, useless hours (at little better than crossing-sweeping) in the study of mineralogical books. I have learned positively to luxuriate in the society of my minerals; they are ever telling me something that is truthful and delightful, and far above and beyond anything that has ever been put on canvas. I desire a cutting made here, and an embankment there, so that the student's train may run more evenly; that students may be spared as much profitless labour as possible; that they may henceforth be counted by thousands, instead of, as now, by dozens; and that they may revel in this cheap, rational, healthful, and elevating enjoyment; for I am more than ever confident of this, as I have written elsewhere—"That the more a man becomes acquainted with God's own works, the more likely will he be to attend to His words."

Liverpool, Dec. 3.

Yours, sticky as ever, T. A. R.

MINERALOGY.

MINERALS: THEIR HISTORY, CHEMISTRY, GEOLOGY, USES, AND COMMERCIAL IMPORTANCE.

BLACKLEAD—PLUMBAGO—CARBIDE OF IRON—OR (MORE CORRECTLY) GRAPHITE.

SIR.—Having pretty well gone through the series embraced under the denomination of iron ores, I now enter upon those in which this metal itself appears to occupy a subordinate position. Of these the carburet, sulphide, and tungstate may be considered the principal types. Upon this occasion I shall confine myself to the first-named—namely, the carburet, or as it is usually though improperly designated plumbago or blacklead, both names implying that lead (plumbum) is a constituent of the mineral. A more fallacious designation was never given. Not a trace of lead, in the experience of any chemist, was ever found as associated with the so-called plumbago. The origin of the name doubtless arose from its communicating to paper when marked by it a leaden or slaty grey colour, passing into iron black, and for this characteristic it has been used from time immemorial for polishing fire-stoves and grates, and hence it is held in the highest estimation by thrifty housewives, and by them is never likely to fall into disuse. The true composition of graphite, when pure, may be considered a very rich carbon, owing its peculiar colour to the presence, in somewhat minute proportions, of foreign matters. Of these elements iron may be regarded as the chief, though it would appear from analysis that even this metal is not always a constituent of plumbago, and in other instances it is discovered in exceedingly minute traces. The elements constituting this mineral, therefore, are exceedingly erratic both in nature and proportions. Dana, the great American authority, quotes six varieties, ranging from 81 to 98.9 per cent. of carbon, and 10 to Zero of iron, with sometimes oxygen, sometimes silica, and in a solitary instance a minute proportion of alumina, taking the place of the iron. Hence it would appear that even the appellation of carburet of iron becomes a misnomer. The true crystallisation of graphite is undetermined, or, perhaps more correctly speaking, it assumes a variety of forms. My collection exhibits hexagonal, and the forms it there assumes are granular, compact, and striated. My specimens are from Borrowdale, Ticonderoga, U.S., Canada (all very splendid types), Germany and Russia (these inferior). With respect to samples I possess from Canada, they bear so close a resemblance to molybdenite that only a practised eye or chemical analysis could determine the difference; the latter process I found very conclusive, though it was submitted to me as molybdenite by a tolerably expert mineralogist. From Ticonderoga I received amongst others a very beautiful specimen of pencil lead, and was assured it was by no means a picked one, but that the supply of such was illimitable. Presumably this must produce a serious effect upon the demand for and price of the Borrowdale variety. With these preliminary remarks I pass on to historical details.

It has probably occurred to few, even those who take the liveliest interest in the scientific and mercantile position of Great Britain, to devote any particular time or attention to such a speciality as blacklead, still there are many features in the enquiry fraught with the deepest importance both to the student and the man of business. Setting aside, for the present, the geological indications of the existence of plumbago in the bowels of the earth, the locality of its natural development in this country is most interesting. In the year 1751 a gentleman who had recently been to the blacklead mine of Borrowdale, in Cumberland, gave a vivid description of his visit, describing the neighbouring market town—Keswick—as bearing the appearance of antiquity, whilst he most flatteringly speaks of the "poorer inhabitants as subsisting chiefly by stealing, or clandestinely buying of those that steal, the blacklead, which they sell to Jews or other dealers." Another writer, in 1794, refers to the Wad Mines, as he designates the explorations, being opened that year, the custom in those days being to work the property every five or seven years, upon each of these occasions taking out a quantity sufficient to meet the interim demand. This writer adds:—"Graphite, or pencil lead, is taken out in lumps sometimes as big as a man's fist, which, when it is pure, soft, black, and close-grained, is worth sometimes 35s. per pound. A third visitor writes about the same time, "In this parish (Seatallorfell) is that famous mine of blacklead, or wad, a mineral very scarce elsewhere, thus described by Mr. Robertson in his 'Natural History of Westmoreland and Cumberland': 'Its composition is a black, piquid,* and shining earth, impregnated with lead and antimony. Its natural uses are to glaze and harden crucibles and other vessels, made of earth and clay, that are to endure the hottest fire; and to this end it is wonderfully effectual, which enhances the price of such vessels. It cannot be made malleable."

Making allowances for the imperfect state of mineralogical knowledge of those days which led the writer to associate lead and antimony in the composition of the mineral in question, it is clear that one of the principal uses to which it is put is now in vogue, and we also learn that amidst the numerous and startling innovations of modern art no substitute has hitherto superseded plumbago in the manufacture of crucibles. The following interesting record of the visit of Bishop Nicolson to these celebrated mines is given in a letter to Dr. Woodward in 1710:—"Having lately had notice of the opening of our wad mines above Keswick, I hastened to see a curiosity which I have never hitherto had an opportunity of viewing, and if this

* Fat or greasy.—Printer's Devil.

were omitted I was never likely to have another. From Keswick we travelled up the valley of Borrowdale, along the banks of Derwentwater, six or seven miles, or more, till we came to Seethwaite Moor, where ascending a high mountain we at length reached the mine. On the first opening of the old level, in the latter end of June last, great discouragement appeared, for no search had been made for 32 years. They found that some pilfering interlopers had carried on the old work till they had lost it in the rock. Upon July 3 (the day that we got thither) a belly was happily discovered before the forehead of the 'old man' (a term with miners for the old works), which proved so rich that in less than 24 hours they had filled several sacks with fine and clean-washed mineral. Dr. Meneth, in his 'Pinax,' would persuade one to believe it so scarce that it is nowhere in the universe to be met with save in Old and New England, and that this is the only place within the four seas where it can be had with us. Mr. Dales would induce one to believe it a common mineral. He particularly reckons up three several sorts of it, brought from so many different countries, whereas he allows that of our English growth (*sic*) to be the best, that of Spain the next, and condemns what is brought from the East Indies as the worst of all."

In an Act of Parliament, 25 Geo. II., c. 10, making it felony to break into any mines, or wad-holes of wad, or black-cawkes, commonly called blacklead, or to steal any from thence, there is a recital that the same has been discovered in one mountain or ridge of hills only in this realm, and that it has been found by experience to be necessary for divers useful purposes, and more particularly in the casting of bomb shells, round shot, and cannon balls. Mr. Pennant says:—"Saw at Dr. Brownrigg's a great variety of the ores of Borrowdale, such as lead, common and fibrous, black jack, and blacklead, or wad. This last is found in greater quantity and purity in those mountains than in any other parts of the world." To what a serious extent would Mr. Pennant modify his sentiments had he possessed the experience subsequent researches have afforded. America, Russia, and Canada have both developed treasures which appear to throw into the shade the boasted quantities, and threaten to rival, if they have not already done so, the superiority of our English product. But of this anon.

The learned Boyle opines, "It is not a metal, and has nothing of a metallic character about it. It is a singular substance. It is found but in very trifling quantities in several mines here, and it may also be in other countries; but the sole mines in which it is found by itself are in Borrowdale. One of the principal uses to which it is put is the manufacture of pencils. Their being confined to this country is so well known and so universally allowed that they are styled abroad *Crayons d'Angleterre*. It arises from hence that this substance is little known to foreigners, the most learned of whom speak of it confusedly, and with much uncertainty. These further particulars we may venture to affirm concerning it, without any danger of misleading our readers, that the mine before mentioned is private property, is opened but once in seven years, and the quantity known to be equal to the consumption in that space is sold at once, and as it is used without any preparation it is more valuable than the ore of any metal found in this island." "But," he adds, "there is nothing improbable, much less impossible, in supposing that other uses will be discovered, which would certainly contribute to raise the value of a mineral peculiar to this country." Continuing this historical sketch, we find in the "Gentleman's Magazine" for 1751 the following interesting and instructive details:—"Skiddaw is undoubtedly one of the highest mountains in Britain, the declivity of which, from White-water-dash, at the foot, to the summit, measures nearly 5000 yards, but the perpendicular height cannot be much more than a fourth part of that. Near Keswick is another lake, near two miles long and four broad, in which several islands are interspersed, but not inhabited, by German miners. We had not ascended far before we perceived some persons at a great distance above us, who seemed to be very busy, though we could not distinguish what they were doing. As soon as they saw us they hastily left their work, and were running away, but by a signal from our guide, who, probably, was but too well acquainted with them, they returned, to the number of 18. We came up to them after an hour of painful laborious travelling, and perceived them to be digging with mattocks and other instruments in a great heap of clay and other rubbish, where mines had been formerly wrought; but though they were now neglected by the proprietors, as affording nothing worth the search, yet these fellows could generally clear from 6s. to 8s. per day, and sometimes even more. The blacklead is found in heavy lumps, some of which are hard, gritty, and of small value, others soft, and of fine texture. The hill in which it is found is a dirty brittle clay, interspersed with springs, and in some places shivers of the rock. It should be added that the lumps found in the rubbish seldom exceed ½ lb. in weight, but those found in the mines are said to weigh 6 or 7 lbs. The mine is situated near the summit of the mountain; at the entrance is the miner's lodge, and there was a principal heap of rubbish, about 150 yards above the one referred to, and here were several fellows and girls at work within pistol-shot of the hut. It appears that in the mine itself the miners work forward for the mineral, and the pits resemble quarries or gravel pits. The mines lie on the east side of a very steep mountain, which forms the west side of the vale of Stomethwaite. There are two workings—the one is about 340 yards above the level of the sea, and the upper one about 390 yards. The perpendicular depth of the lower one is about 105 yards, and of the upper between 20 and 30 yards. There are two certain marks on the surface to direct the miner to the mineral. The strata of the mountain are very irregular and broken, and the blacklead 'probably' found in the fissures of the rocks. There is no regular stratum of this mineral; it is met with in lumps and irregular masses. The miners generally work through a quantity of earth, mixed with stones of various kinds, then a species of hard grey granite, and after that a dark blue stone of a softer nature, where they sometimes meet with the mineral. Quartz and crystals are found in the workings. The rock adjoining the mineral is sometimes tinged as dark as the mineral itself to the depth of 2 or 3 ft. The mines are well defended against pilferers by a temporary mason-work and walling within, and a house over each entrance, which are occupied by the stewards and workmen. Of this mine it is written in 1792:—"The Wad mines were very unsuccessful for many years past, but last year they met with the blacklead again in a pretty large quantity, but of the inferior quality, of which the miners in a short time procured about 5 tons. The mineral is described as lying in the mine in form resembling a tree; it hath a body or root, and veins or branches fly from it in different directions; the root or body is the finest blacklead, and the branches or extremities the worst the further they fly. The metals (query, minerals) in the low mine lies in two veins—one crossing the other; where they cross is the main body, and the best blacklead and the veins fall perpendicularly for 60 fathoms in depth, the blue rock on each side; at the end of 60 fathoms they found the end of the cross vein, and a large sop of the mineral, which came out as if it had been in a wrought basin—the form of the blacklead and the rock were so equal. A blue rock lies on each side of the mineral, and sometimes there is a wet sludge between the rock and the blacklead. It is, also, sometimes found in sops or floats in a body, without branches. W. WHITE.

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[To be continued.]

METEOROLOGY—THE COMING WINTER.

SIR.—Although meteorology is one of the youngest of the natural sciences it shows a healthy growth, and already lends substantial aid to man in his battle with the elements. The law, for instance, of circular storms enables the Meteorological Department to forewarn our coasts and those of our neighbours of the approaching tempest. The next great step, it is hoped, will give us the power to forecast the general character of the coming seasons. As yet no theory with this view has stood the test of experience, or commanded the assent of the scientific world. It is the object of this letter to make known to your readers the main features of such a theory, advocated chiefly by French meteorologists, and based on the familiar idea that the vicissitudes of our climate are due to the antagonism of great equatorial and polar air currents.

According to this view there exist two master currents of air—one passing over the Atlantic from south-west to north-east; the

other to the eastward of it, flowing back from north east to south-west. The existence of such general currents is now not doubted, and to their influence may be chiefly attributed the strong contrast exhibited by the climates of places in the same latitude in Western Europe and Central Asia. Each of these broad currents may be likened to a great river flowing in an extended plain, subject to floods and lateral overflows, but whose main channel slowly varies its course from side to side.

If we consider the Atlantic current, and suppose its main channel to occupy its easternmost position, we shall have a vast body of warm moist air flowing over Western Europe, giving to it mild winters and wet summers, with frequent storms, which are no other than whirling eddies in the great stream. Such were the seasons of 1871, 1872, and 1873.

Let us now suppose the main channel of this current to have retreated over the Atlantic plain so that its course passes at a certain distance to the westward. Our islands and the adjacent continent would then lie, as it were, in a hollow between it and the down north-east current further east; and we should enjoy the fine weather with which we have been blessed during the past year. It must be remarked that, entirely in accordance with this view, during this same period our extreme western and north-western coasts have come in for much rain and storm, and that the north-east current has been felt with more than ordinary severity in Asia Minor and the Eastern Mediterranean.

If, pursuing its retrograde course, the main channel of the Atlantic current should recede still further to the west, then the supposition is that the corresponding north-east current would also come further westward, bringing with it severe winter cold. If this theory be correct, a knowledge of the position and tendency of movement of the main channel of the Atlantic current should afford us the long sought for key to unlock the secret of the coming season. At any rate, enough has been adduced to show the importance of a more extended and more accurate study of the Atlantic air stream. This can be done by an analysis of the logs of the steamers and other ships so incessantly crossing this ocean, and the Meteorological Office have alone the means of doing it. Any forecast based on general reports must necessarily be very vague.

We have, however, in accordance with the above views, some indications that the winter will be colder than for some years past. Severe cold has already set in at the head of the Baltic, and we hear of great storms along the Western Atlantic. On the other hand, the weather on this side also has been more stormy than it was last year. But our storms may be caused by overflows of the Atlantic current, whose main channel may, nevertheless, be far to the westward.

C. O. B.

WHAT IS ELECTRICITY?

SIR.—Will you allow me to make some remarks in answer to the letter of a "Constant Reader" in the Supplement to last week's Journal? A "Constant Reader" states that if a poker is left in a fire in an ordinary grate the end which is in the red-hot coals becomes heated. How is this accounted for? He states that the molecules of the iron become violently agitated by the heat generated. This motion is increased until the whole of the iron gets hot. The above is the theory a "Constant Reader" has been taught; he believes it to be the correct theory of heat, and how the iron poker is heated when in the fire. If the above iron poker experiment is to be a proof of the modern mode-of-motion-theory of molecules of the iron becoming violently agitated by the heat generated, it cannot understand it.

In the first place, does the heat generated come out of the poker? for if we take the above theory to be correct the heat must come out of the poker, or be generated in the poker, and if so we do not want the fire, because the molecules of the iron would become violently agitated, and heat would be generated, and the poker would become hot without putting it near a fire. As I have said before, it is the same theory as Bacon's, above 600 years ago. It is only an imaginative theory, and there is not the slightest sign of its being the correct theory of heat, and the more you investigate it the more you can see the absurdity and fallacy of such a theory. Suppose I compare Bacon's theory of heat with the theory a "Constant Reader" believes to be correct. Bacon—the great Bacon I mean—invented gunpowder, so it is stated; there were several noted men of the name of Bacon, but this was the most celebrated, and he was the greatest man of his day.

A "Constant Reader" states molecules of matter; Bacon states particles of matter. A "Constant Reader" states, the violent agitation of such molecules of matter generates heat; Bacon states, the vibration and motion of such particles of matter produces heat. I want to know what difference there is between the two theories. I cannot see any. They both mean the same, and they are both suppositions only. Nearly, if not quite, all the theories of heat brought forward from the time of Bacon up to the present are the same in meaning, and the same as Bacon's theory of heat, and his was the first theory of heat ever written by man. If a "Constant Reader" can prove it to be the correct theory he must give Bacon the credit of the discovery, and the modern chemists the credit of finding the new names for Bacon's old theory of heat.

My theory of the red-hot poker is as follows:—First of all we will suppose the fire is not alight, as it is called, and the atmosphere of the room is up to 24° of heat, only 8° below freezing-point; the poker is cold now, it is hot in comparison to the mercury, for the heat of the body is only comparative. The heat of solid mercury would be about 63° below the heat of the poker, and the poker would be 24° above zero. Now, suppose we force the poker into the solid mercury, the poker would be so hot that it would melt a hole in the solid mercury quickly, and the hot poker would quickly lose its heat, and become as cold as the solid mercury; the melted mercury will also become cold, or lose its heat and become solid again, and our poker will remain stuck fast in the solid mercury, our once hot poker is now called a cold one, supposing the surrounding atmosphere to remain at the same heat as the solid mercury—say, about 79° below the freezing point of water. If you force a red-hot poker into a piece of lead the same thing will happen: the red-hot poker will melt a hole in the lead, and when the melted lead gets as cold as the average temperature of our atmosphere the lead will become solid, and the poker will stick fast in it. How can we call this a motion of molecules of matter? I cannot see the least reason to call it so. The fact is, the heat in the poker is only mechanically mixed with the iron of the poker, and it goes off by radiation; heat is a material. I believe in this letter I can prove my theory to be correct.

Now, we will take the poker out of the mercury and bring it into the hot room, the hot room is up to 24° of heat, and the poker will quickly become hot in the room, without the aid of the mercury. The heat in the poker more now than when it did when the poker gained the heat it did gain when it was taken from the solid mercury and placed in the hot room up to 24° of heat, where it gained 63° of heat. If the above theory is correct in one case it must be in the other, and we ought not to want the fire; but the modes of motive action should go on, and the poker become red-hot without the use of fire. The only difference in the red-hot poker is that it has taken in more heat, and the more heat it takes the more it expands; and if the end now red-hot measured 1 foot before it was hot it will now measure a little over 1-16th of an inch longer than it did when it was cold; also it will be luminous, because at about 900° of heat iron begins to be luminous, and at 1024° of heat our poker will be red-hot. I have done all I can to prove the mode of motion theory of heat to be incorrect, at the same time strictly adhering to the truth, and I shall continue to do so throughout, and I shall try all I know to prove my theory of heat to be the correct and only theory that will stand investigation.

Now, we know the poker to be red-hot. Where did the heat come from, for you cannot have something out of nothing? If it is only heat, did it come out of the coals? I say no, it did not; for there is no more heat in a ton of coals than there is in a ton of flint stones. When the fire was lighted you started a chemical process called combustion, and in that process the following actions go on:—The oxygen gas of the atmosphere combines with the carbon of the coal, and it produces carbonic acid gas, a heavy gas weighing 1½ oz. to the cubic foot; oxygen gas weighing 1 oz. to the cubic foot. When the oxygen of the atmosphere combines with the carbon of the coal and produces the above gas heat is liberated. I will give further particulars of carbonic acid gas at some future time, for I am afraid of making this letter too long. Other portions of the oxygen gas of the atmosphere combine with the hydrogen of the coal, the solid hydrogen of the coal combines with the solid oxygen of the oxygen gas of the atmosphere, and water is produced, and the heat that was chemically combined with the solid oxygen in the atmosphere is now liberated, and if liberated in a close furnace it would be at a heat above 4000°. But in the generality of fires the heat is taken away so rapidly by surrounding bodies and by radiation in all directions that common fires only produce about 1000°. Thus you see the heat to make our poker red-hot came out of the atmosphere, it was chemically combined with the solid oxygen of the oxygen gas of the atmosphere, proving the oxygen gas of the atmosphere to be a compound, and to consist of solid oxygen and heat chemically combined. I think it is plain enough for anyone to see that the heat required to make the poker red-hot was not generated at all by molecular motion or mode of motion; heat is a material, and cannot be generated or made; it can be concentrated and liberated, and with respect to the red-hot poker and the mode of motion and molecular action theory, if we had to wait until the above process made the poker red-hot we should have to wait forever. The material heat was liberated and our fire was up to 1024°, and the poker got red-hot because it was in the hot place called a fire, and such fire was up to the above degree of heat, mechanically mixed.

As a proof of where the heat came from, suppose we cause 111 ozs. of the solid hydrogen of the coal to combine chemically with 889 ozs. of the solid oxygen contained in 889 cubic feet of the oxygen gas of the atmosphere, we shall produce as

near as possible 1 cubic foot of pure water, weighing 1000 ozs.; by the above chemical process we have reduced 889 cubic feet of the oxygen gas of the atmosphere to less than 1 cubic foot, and in so doing we have liberated all the heat that was chemically combined with the solid oxygen in 889 cubic feet of oxygen gas, and the above gas and heat were in the atmosphere. All the heat liberated has become heat mechanically mixed with the atmosphere, and before it was chemically combined with the atmosphere. Before we lose it all by radiation we must believe that the poker was made red-hot with the above heat coming from the atmosphere. Now, we have our cubic foot of water, and as the room is called a temperate room, 24° only, we will allow it to become a large piece of ice, weighing 62½ lbs. This large piece of ice came out of the coal and the atmosphere, 1-16th of it came out of the coal and 8-16ths out of the atmosphere; or, we might say, 111 ozs. of it came out of the coals and 889 ozs. out of the atmosphere. The 111 ozs. of solid hydrogen were chemically combined with the solid coal, and the 889 ozs. of solid oxygen were chemically combined with heat or electricity in a certain form, and formed oxygen gas in the atmosphere.

I have stated that electricity is only free heat. I believe I can prove it one way, and that by the use of a "Constant Reader's" poker. Suppose you have an iron conductor (say) 200 ft. high and 6 in. diameter, such a conductor would relieve a large thunder-cloud, as it is called, of a great deal of its electricity without making such a conductor hot. Now, suppose the above conductor was fixed with its bottom end 3 ft. above the surface of the earth, and if a "Constant Reader's" poker is 3 ft. 3 in. long and ½ in. thick, we will connect the top end of the poker to the bottom end of our large conductor, and the point, or other end, of the poker will enter the moist earth to the depth of three inches. We will suppose our conductor finished, and are waiting for a thunder-storm to try it; we have a storm quickly, and our large conductor receives a full supply of electricity or free heat, but not enough to overcharge it, and make it hot, the electricity will pass down our large conductor with great velocity, until it comes in contact with the poker, when it will be stopped to a great extent, the poker will be overcharged, become red-hot quickly, and will be soon heated up to, we will say, 1024° of heat. Is the poker made red-hot by the mode of motion processes? Do the molecules of the iron of a "Constant Reader's" poker generate heat? Has the motion of the particles of the iron got anything to do with it? I say no, impossible. How can a theory built up on imagination, bolstered up with all sorts of terms, and explained in all sorts of mysterious ways, stand before a simple matter-of-fact theory that all but speaks for itself? The old theory of heat, before a true theory of heat, must melt away like dew before the sun. The poker is made red-hot this time by means of free heat, called electricity; when the electricity entered our large conductor it was not stopped in its passage, nor impeded in any way, therefore it passed down it at a great velocity, its proper velocity, but when it arrived at the poker there was not metal enough to conduct it away so quick as it was supplied. It accumulated and had time to become mechanically mixed with the iron of the poker, and now it is mechanically mixed with the iron it is no longer called electricity, but is called heat. If a "Constant Reader" thinks it over he must admit that it makes no difference whether the poker is made red-hot in the common fire he mentions, or whether it is made red-hot with the electricity from the clouds, so that the poker is up to the same degree of heat, (say) our old heat of 1024°, the poker will take the same time to cool down. The heat in both cases was only mechanically mixed with the iron of the poker, and in each case there was the same amount and degree of heat in it.

I have not done with a "Constant Reader's" poker yet; 3 inches of it went into the moist earth, and the electricity passed through it into the moist earth and decomposed some of the water, then chemically combined with the materials of the water and produced gases, and they would have remained as gases for any length of time, but the red-hot poker was there, and directly the above gases escaped from the ground they came in contact with it, the gases ignited, and water was again produced, and the heat went away by radiation into the atmosphere, where it mixed (like a drop of water would be by sea) with the great quantity of heat now mechanically mixed with the atmosphere.

A "Constant Reader's" iron poker will be of great use to us in the next explanation, and after that the first place we have to explain is the heat of the electricity from the clouds, it enters at the top of our large conductor, and if it should be dark at the time, most likely you will see a flash of light, or a sort of ball of electricity at the moment the electricity enters the top of our large conductor. From the top of our large conductor to the bottom it is charged with free heat, or electricity. And now for a "Constant Reader's" poker, for the last time; it is red-hot, and it is also charged with electricity, but we must not call it so now, because it looks so much like common heat, and so it is; it is heat, or electricity, mechanically mixed with the iron of the poker.

Now for the gases in the moist earth, here we have the heat chemically combined with the solid materials of the water or ice. The large conductor, diminished to a small diameter at the end that enters the earth, will show heat, or electricity, in all its conditions, first at the top of the conductor as free heat, also travelling down the thick conductor, as so-called electricity travels along a wire; then in the thin iron of the poker, as heat, so-called. At last we find it thoroughly entered into chemical combination with other materials and formed into gases. I think I have explained enough about gases for that part to be understood without further explanation. I could bring many other proofs to prove my theory to be true, but it would occupy too much space. With respect to a "Constant Reader's" statement that my theories, if true, would cause a revolution in the scientific world, and the whole science of chemistry have to be re-modelled, I knew this more than 30 years ago, for it is fully that time since I tried most of the experiments I have mentioned. In 1844, just 30 years ago, I told a great and well-known man that I had made some discoveries with respect to, and in connection with, electricity, and I believed that such discoveries, properly applied to useful purposes, would prove of great value ultimately. I believe the old theory of heat will be overthrown this time, for it has lasted above 600 years, and that is long enough for a false theory to last. With respect to the letter of "Electro," I am much obliged to him for the kind feeling shown in it, as such letters give me encouragement to go on and do good if I can.—*Marey-road, Old Kent-road.*

RICHARD JEX CRICKMER.

MINING IN CARDIGANSHIRE, AND THE VAN AND VAN CONSOLS IN MONTGOMERYSHIRE.

SIR.—Taking a retrospective view of the mines in this county, and the other two mentioned in the adjoining one, for the year that is now so soon to close, I do not think that we have any reason for grumbling, but on the contrary, during a period of what may truly be termed as without a precedent for the past half-century for everything that was really bad to all and everything pertaining to mines and mining, that we have much to congratulate ourselves and those interested in these counties, not only for the mines in nearly every case holding their own, but that notwithstanding the great increase in the price of labour, the price of materials, and the fall in the value of nearly all the metals, they have, as I have before mentioned, not only weathered the storm, but the end of the year sees most of them producing in quantity and quality quite as much lead and silver as they were doing 12 months since, whilst some of the new mines have been brought into a state from the progressive into the dividend paying, whilst others have opened out courses of ore that cannot fail to bring them into a similar state in a few months, and those very few that have, on the contrary, been brought into a state of non-returns (not from the unproductiveness of the lodes in them, but from the method of working systematically adopted for many years previous of picking out the eyes of the bunches of ore, and not deepening their shafts or extending their levels) have been the means of opening the eyes of others to see how the failure (if it can be termed as such) has originated, and instead of these mines being abandoned, fresh capital is being raised to reconstitute them; and with fresh blood and fresh energy there is no doubt in my mind that they will be brought into a much more profitable state than has ever yet been the case. It will not be expected that I should go into details as to the prospects of the whole of the mines now at work in the two counties named, it would take too much of your valuable space for me to do so, and I shall, therefore, content myself by briefly noticing how matters stand at present, and how they stood this time last year.

Beginning, then, with Llanfair, the most southern mine in the county during the past year. Machinery has been erected for giving the mine a fair trial; it produces the richest silver-lead ore, or silver ore, in the county (for it is more valuable for the latter than the former) and will undoubtedly prove a good-paying property on the capital necessary to develop it.* Between this and the mines at Pontrhydy-fenddiggid very little has been done for some years past. At Strata Florida ore has been raised by tributaries, the shareholders doing nothing to prove the mine. This property has now got into other hands, and fresh capital subscribed for its working, and from the large quantities of ore taken from the little ground explored, I have no doubt it will prove a profitable investment.

Old Esgrif Mwyn Mine has been worked by tributaries, and the halvans at surface has yielded a large quantity of lead ore at considerable profit. Capital is wanted for working this the once richest mine in Cardiganshire. The Lisburne mines, comprising Glogfawr, Glogfach, Level Fawr, Frongoch, and West Frongoch, on the whole, are producing the same quantity and giving the same profits as for some time past, and if any alteration it is for the better. At New Lisburne an important discovery has been made, and should it continue must prove valuable to the owner and do good to the community. Grogwinion has been brought from a progressive mine into the dividend List, and is likely to prove a most valuable and durable mine. Old Cwm Ystwith is no better nor worse than it was. Dolwen and East Dolwen little does and less doing. De Broke has opened out some good ore, and is now making regular returns. At Nant-y-Cria little or nothing has been done during the past twelve months. If the property were not on Crown ground, the clauses in whose leases are so objectionable, this mine would not be allowed to stand still, paying 80l. per year as a minimum royalty, but would be properly worked and paying some hundreds

*The particulars of this and every other mine in this county may be gleaned from my pamphlet, entitled "The History of the Cardiganshire Mines from the Earliest Ages, and Authenticated History to A.D. 1874, with their Present Position and Prospects." Price 2s. 6d.—London: MINING JOURNAL OFFICE.

sterling yearly as dues. Great West Van is in as good a position now as twelve months since, or rather better. West Esgrif Lile is opening out courses of ore which I should think must leave a considerable profit in working. Little has been done in Bryn Glas, but machinery has been purchased to erect on it. Blynllimon as it was. Llywernog has gone into other hands, who will, I believe, make it a paying concern; the change, therefore, is for the better. Clara Consols without alteration. Powell Consols; the ore ground has been worked at a profit and excellent courses of ore laid open. Water machinery is erected where steam was used, and this is now a good mine, and will soon be giving very handsome dividends. Great credit is due to the managers and proprietors of this mine for bringing in an abundant supply of water to this end, in fact, to the other mines in the neighbourhood, which can now be worked very economically in comparison to working by steam-power. This mine twelve months ago was doing but little, therefore a great change for all concerned in it and the prosperity of the locality has taken place.

At East Llyn Teify little has been done, which is to be much regretted, for a small capital would give it an effectual trial, which it most richly deserves. At Llyn Teify good ore has been opened out on the south lode. Capital is being raised to work it effectually, and a successful result, according to my opinion, is a certainty. Aberystwith mines are returning about the same quantity as for some time past. Ystumtean old mine is being cleared, and some good ore ground laid open. Caegynon has improved in depth, and will continue to do so. I consider the mine looking better than it was twelve months ago. At South Bwadrain during the past twelve months a new water-wheel, 30 ft. in diameter, 3 ft. 6 in. in breast, with pumping and drawing machinery, has been erected. The engine-shaft is sunk to the 12, under adit, and good lead and blenda ores opened at that depth. In a few months more this property will speak for itself. I have not seen finer stuff for making rich deposits of lead ore broken from any mine in Cardiganshire. Bwadrain is no better or worse than twelve months ago. Gelliririon had two men at work a year since, none now. The Rheidol Lead Mines have a capital raised sufficient to bring them into a profitable state, and they are now opening rich and paying ore ground, and will soon enter the Dividend List if matters are properly carried on. Tyllwyd has had a good field of machinery erected, and a large quantity of rich paying ground laid open. The best, however, is yet in store, and this is one of the prizes for this year, and for dividends in the coming one. Gothic nothing done or doing. Nant-y-groen has had a capital subscribed for developing it, and machinery put up for allowing the sinking of the shaft to a greater depth, as well as to draw the stuff. The back of the vein contains a fair quantity of lead ore, and should be made to pay. It will be seen that this, therefore, is in a better state than at this time twelve months. Old Goginan has had a fresh capital subscribed, and a little more doing than was some time ago. A new bubble is being tried (Dorlase's), and we shall, I expect, soon have a chance of proving whether we are to derive advantages from the dressing of slime ores in this county by its adoption. Melindur Valley started, and doing well. West Goginan improved. Bwlch Consols without any alteration. Cwm Erfin has been purchased from the late company by the owner of the land, Mr. William Jones, Llwyn-y-Groes, near Lampeter, who has placed the property in my hands for a short time to raise the necessary capital to give it a proper trial, and before this meets my eye in your columns I hope I shall have succeeded in doing so. A very small outlay will suffice to make this mine as good or better than it ever was, at least I think so, and I am far from being alone in that way of thinking.

South Darren has improved prospects, and Old Darren ditto. Bronllyd, after having undergone liquidation, is now placed on a good footing, and will again soon enter the Dividend List. East Darren as usual. Llawn-cwm-bach as it was—very little doing. Camdwr-bach, or South Esgrif-hir; the lode in the adit, which is from 20 to 30 ft. wide, has been cross-cut in different places, and has laid open ore in paying quantities. Capital is being raised to give this a proper trial, and to erect machinery. This can be done for from 2000l. to 3000l. It is on the same lode as Eagle Brook, where they have lately discovered a rich course of lead and copper, coming towards the boundary of Camdwr-bach. The Eagle Brook is now opening out rich ground, and will soon begin to give handsome profits. Esgrif-hir has rich bunches of lead ore, but is slowly worked. Little has been done, or is doing, at Blaen Caelan, and the same remarks will apply to Allt-y-Crib. Tan-y-alt is said to be looking better, and taking the mines mentioned, and those not included in this list, I consider that we stand in a much better position in every sense of the word than we did at this date in 1873. So much for Cardiganshire, and now a few words as to Van, the great mine of the Principality. I will merely remark that prices have fallen nearly 100 per cent., whilst returns have been regularly made, and profits regularly given, during one of the most trying years ever, perhaps, experienced, and when we consider the prices of labour and materials reduced, and the value of the ore rising in the market, one is induced to wonder what it all means. This could be put right with a very little trouble, and it would be a great source of satisfaction to the shareholders to obtain it—an estimate of the ore ground laid open during the past 12 months, and the ore taken away—and this alone would show whether there is real cause for the great drop in the value of this, I may say, unprecedentedly rich property. Van Consols is now on the eve of paying dividends, and nothing, in my opinion, can prevent it from becoming in time a formidable rival to its next neighbour last spoken of.

ABSALOM FRANCIS.

Goginan, Aberystwith, Dec. 8.

CARDIGANSHIRE MINES—TALYBONT DISTRICT.

SIR.—I notice a short letter in the Supplement to last week's Journal relative to the Tan-y-alt Mine, where a fine course of ore is now being laid open on a north and south lode. I hope this will prove lasting in length and depth, as it has at present very appearance of doing, and draw public attention to this district, which owing to a combination of circumstances has been for some time under a cloud. Even this mine would have been working years back if it were not for the deception practised upon the then proprietors by a person now better known than trusted, at least in that neighbourhood. Look, again, at the ALLT-Y-CRIB Mine, now in liquidation, but which I notice in the Share List as belonging to a company with a capital of 40,000l. What has become of all this money? Have the shares ever been issued to that amount, if not, how many? Then I notice in another part of the Journal a mine called CWM LERY, 17 shares quoted 12s. 6d. Surely this cannot be a few shallow workings of that name near Talybont with a small plant of machinery at surface. Then there are the ERGLODD and PENPOMPREN Mines, which have already appeared as three or four different companies during as many years, but have never been worked, at any rate with any spirit, and the landlord informs me they are now idle, and I should say likely to be as it will take a large capital to put them in working order again. Further north the TALIESN Mines now idle, and I believe in liquidation, a large capital having been lost.

As a contrast to this we have the DOLCLITHOR Mine, spiritedly worked by one gentleman, who has spent 15,000l. chiefly in sinking, the shaft being now 65 fms. deep, and after many disappointments is in a good course of ore, which the agent informs me is worth upwards of 1 ton to the fathom, thus proving that money legitimately laid out meets with a return, though I must say that there are more promising places than Dolclithor to lay out 15,000l. in. All these mines are within a circuit of (say) one mile from Talybont, and, consequently, close to the mine to which Mr. Balcornie refers. How is it, then, that this mine, with but a small capital, has turned out a trump, while all around is wreck and ruin? It is not to be supposed that there is lead in this one lode and this one spot, and not in any of the others. The same lode traverses Allt-y-Crib, and, I suppose, Cwm Lery sets, but I do not think it has been worked in either, probably because it is a north and south lode. All I can say is that if a north and south lode produces from 4 to 5 tons to a fathom—as this one does on Tan-y-alt, and I have no doubt any gentleman will be allowed to see for himself—it is better to throw away prejudice and lay out money on it than to follow out east and west lodes and —

The scheme of Mr. Betteley is a good one, only I think it might

embrace the purchasing of shares in promising mines. One thing is obvious, that the present system of selling at enormous sums, whether in cash or shares, to companies, and declaring dividends out of sales of ore that in reality has not paid the cost of producing it, must cease.—*Aberystwith, Dec. 10.*

MINING ASSOCIATION FOR SHROPSHIRE.

SIR,—There can be no question as to the benefits that would be derived could such an association as that recently recommended in the Journal by Mr. Jasper More be established for Shropshire. To the list of subjects enumerated by Mr. More for periodical discussion might be added papers on practical geology, such for example as the formation of veins, the probable processes by which they may have been filled, the characteristic properties of productive and non-productive lodes, the analogy between the contents of a vein and the country rock, &c. There might also be discussions as to the most approved mining machinery for general or special purposes, whilst an interchange of ideas upon the best systems of ore concentration, rock-boring, and on explosive materials, &c., could not fail to be beneficial to all taking part therein. If Mr. More would consent to receive the names of those connected with the Shropshire mines who are desirous of becoming members of the proposed association it might perhaps result in some decided move being made.

Shropshire, Dec. 8.

MANAGER.

ROMAN GRAVELS MINE.

SIR,—Being a shareholder in and acquainted with this mine for several years, I was interested in reading the letters in the recent Journals thereon. Your correspondents comment on Mr. Tredinick's remarks upon a falling off in dividends in the lead mines of Wales, including Roman Gravels. I hope you will allow me to remind my co-shareholders that the first four dividends paid by the Roman Gravels amounted to 12,000*l.*; the second four dividends, 16,800*l.*; the third four dividends, 20,400*l.*; also that notice has been given of 5100*l.*, payable on the 23rd inst., towards the fourth series of dividends. From my knowledge of the property, it is apparent to me that the promises of the directors for the future will be as ably sustained as in the past. I would also remind my co-shareholders who have not availed themselves of the privilege of seeing the mine that, to use our manager's phraseology, "lanes of lead ore ground are to be seen in Roman Gravels" to an extent and value few of your correspondents have had the good fortune to enjoy. The new shaft now ventilating the mine to the 65 fm. level will be holed to the 80 fm. level in six months, and to the 95 fm. level by February, 1876 (see Capt. Waters's report of the 5th instant). The machinery at the floors is capable of dressing an immense quantity of lode-stuff, and when the shaft is complete the monthly returns of lead may easily be increased to 400 or 500 tons.

A NON-SELLER OF ROMANS.

SOUTH CONDURROW—CAPTAIN VIVIAN.

SIR,—For the past two or three years there has been an inclination to supplant old and tried agents for new ones, as at North Roskear, Carn Camborne, South Crofty, New Dolcoath, and Wheal Seton, and the results are call-paying or suspended mines; but the latest and most flagitious ingratitude has been manifested towards the managers at South Condurrow. Messrs. Vivian commenced operations here on a limited scale, but persevering labour, combined with experience and wisdom, discovered a large and rich lode; they then erected powerful machinery, and laid out dressing-floors where tin ores can be prepared for the market as cheap, if not cheaper, than most mines; and they have also opened the mine underground in a way which even the most prejudiced cannot condemn, and just as they hoped to reap the reward of years of untiring labour they are dismissed; and for what? Echo answers, "Naught."

Capt. Joseph Vivian has been taking a prominent part in mining affairs for the past 50 years, and his fame is interwoven with the very existence of hundreds of our old miners in this and other localities, and his name is being handed to posterity under the "humble, yet not inglorious" epitaph, "The friend of all." Capt. Vivian's employees worked harder, and obtained better remuneration; and they were always pleased to see him, as he had always something satisfactory to tell them; he was always ready with his advice when solicited; always encouraged manliness, and hated cringing, fawning insinuations; he was one who had unparalleled chances of acquiring wealth; one in whose constitution was mettle (not india rubber, as is too frequently the case with mine agents and inspectors now-a-days); one who did not add or detract from the truthfulness of a report by an extra 1*l.*; one who has speculated freely and largely of his income in mining explorations; one who has never been slow to adopt improvements in mining. Such is the man who has worthily stood at the head of Cornish mine managers who has filled important posts, and whose honesty and veracity has never once been doubted, and whose services are perpetually dispensed with without a charge or blot, save the non-vindicative blur of "driving too many cross-cuts."

Mr. Weston, the Chairman of the special meeting of Dec. 2, may even envy the Messrs. Vivian in their downfall, as they have the satisfaction of doing their duty to the utmost (although not reciprocated by 10 or 12 shareholders), whilst Mr. Weston cannot but feel "joyous" at seeing his speech reported. In his exordium he rather sided with the Messrs. Vivians, then stated his intention of being neutral, then voted against them, and finally hoped it would not injure them, as he believed them to be thorough miners, which is an equivalent to a kick and hope you are not hurt, or pouring water on you and hoping you are not wet. I think Mr. Weston would make a kind, tender-hearted (yet unskilled) physician, he knows nothing about diagnosis, but seems to be an adept at cicatrization.

EDWARD SKEWIS.

SOUTH CONDURROW MINE.

SIR,—Mr. Waddington states in his last letter that I accuse him of misrepresentation, and that it may have suited me on the eve of South Condurrow meeting to make him appear a liar, if in my child-like innocence I believe an untruth to be a misrepresentation. I have nothing to retract, nor is an apology required from him; but the word liar I hate, and I should have hesitated a long time before I applied the term either to himself or any other person—if, however, he likes to do so to himself I have no objection. He then goes in for the champagne business again, and I feel ashamed any man, especially a man of such magnanimous ideas as Mr. Waddington, could find a handle to make use of in such a trumpery matter. The facts, in a few words, are simply these—his friend, Mr. Vivian, will put me right I have no doubt if I err—Some four years since, talking over the appearance of the mine after attending one of the meetings, Mr. Vivian said the mine was looking much better, and we should soon see shares 5*l.* each, and ultimately he believed they would reach 10*l.*, or even 20*l.*, per share. I made answer as soon as they get to the former price I will send you a dozen case of champagne to drink success to the mine, and if they ever reach 10*l.* I will send you a three-dozen case, and if I ever live to see them 20*l.* each you shall have a six-dozen case. Shortly after they reached that price, and I duly sent on the wine. Time passed on, and they reached 10*l.* per share, the consequence being I redeemed my promise by sending him a three-dozen case; and, as I look upon my promise, perhaps, in a more sacred light than Mr. Waddington may do, if they ever should reach the latter price I hope I shall not be found wanting. These are the plain facts of the little mole-hill which Mr. Waddington has tried to convert into a great mountain. At this time I believed the mine was being worked for the benefit of shareholders; and since that time, however, I have had cause to entirely change my opinion; and although my conscience may be a little more elastic than that of Mr. Waddington's, and although he may think that none but mining jobbers have honest motives, I shall never regret the course I have taken.

Mr. Waddington, in closing his correspondence, with his usual kindness towards me, would leave me in the happy embrace of some friend or friend of his, who, for some deadly sin committed on Oct. 30, 1872, had been consigned to the depths of darkness, from which he has just emerged with all the odour of the sulphuric regions still strong upon him, "since which he by some means has given offence to Mr. W." As I think, however, the atmosphere he breathes, and the place itself, would be more congenial to the feelings of Mr. Waddington than myself, I beg to decline his acquaintance. Mr. Waddington can enjoy his friend's society alone in his glory.—*London, Dec. 9.*

P.S.—To put "F. K. V. V." right, I must tell him I was never on the mine in my life with Mr. Fraser.

OLD TALARGOCH MINE.

SIR,—Mr. Collyer is right. It is folly in the extreme for men to invest their money in American notions, which have yielded only mortification in nine cases out of ten. The mine he speaks of I was surprised to find advertised as sold to a new company. I know it has in the past yielded fortunes to its former possessors, and it seems unaccountable only that a series of disasters came upon them and they had not any reserve, having paid away all they earned in dividend, without

thought of the proverb about a rainy day. The appellation the "Great Talargoch" is a correct one, for it is great in all senses, great in size, great in richness, great in the enterprise of its owners, and under the new management it will I trust be a greater wonder still. That they have scope and means to open out the mine is at once a certainty of success, and with the economies alluded to by Mr. Collyer a bright future is before the shareholders. I fully expect that early investors here will be in the position of the first holders of Van, Minera and Caradon shares. As the allotment is made with 2*l.* paid-up the fortunate holders can realise at a premium at once; but I should advise "hold back," as, if I am not awfully deceived, the price will be doubled in a short time. It is only once in a lifetime that such a mine is in the market.—*Chelchford, Cheshire, Dec. 9.*

T. S. BARRETT.

WEST CHIVERTON MINE.

We have been requested to publish the following letter, which was addressed and has reference to the *West Briton*:—
SIR,—On reading your remarks on the late management of the West Chiverton Mine, which appear in your publication of yesterday, I am much surprised to find that you have included the name of Capt. Nancarrow with that of Mr. Clogg, Capt. Juleff, and the other officers dismissed, for I think you cannot but be aware that Capt. Nancarrow was never discharged from the service of the West Chiverton Mining Company; and I beg to say that we have the greatest confidence in him, and have received many testimonials in his favour.

Also, in your report of the special meeting held on the 1st inst. you make me say there is but one proxy against the committee. What I did say was there was not one.—*Truro, Dec. 4.*

THOMAS SMITH, Chairman of Committee.

SOUTH WHEAL FRANCES.

SIR,—I should say that after such a convulsion of Nature as must have occurred with Capt. Richard Goldworthy in his efforts to annihilate the agents of this mine that if they are not vanished I feel assured they must feel under a cloud—how can they survive such a vigorous onslaught? Possibly, however, the agents are men of common sense, and do not understand such a volcanic eruption as that fired at them in last week's Journal. Although I am not personally acquainted with either Capt. Goldworthy or the South Frances agents, my object in calling attention to Capt. Goldworthy's remarks is to suggest that mine agents should be more charitable to one another. There is now-a-days too much covetousness or undermining, that of one agent trying to supplant another. First by an adverse report, then by promises that there is no probability of being carried out. If those clever agents would go and take a grant of a new piece of mining ground (of which there is plenty), and open up a good mine by their own ability and judgment, it would be more to their credit. Although even then they would not be safe in their success, as some large shareholder would soon want the agency for a *protege* of his own. Such is my experience.—*Dec. 9.*

A. CLARKE.

ST. JOHN DEL REY MINING COMPANY.

SIR,—In the Journal of last Saturday the following paragraphs appear:—

Page 1327: "The directors have declared a dividend of 10 per cent. for the half-year, payable on the 24th inst., after carrying 10 per cent. thereon to the reserve fund."

Page 1328: "It is proposed to pay a dividend of 10 per cent. for the half-year ending Nov. 30, being at the rate of 20 per cent. per annum, and to carry forward 10 per cent. on the capital to the reserve fund."

The first named is in substance correct. The dividend will be 10 per cent. on the capital, and 10 per cent. on the dividend will be carried to the reserve fund.—*Tokenhouse-yard, Dec. 9.*

JOHN HOOKIN, Managing Director.

RICHMOND CONSOLIDATED MINING COMPANY.

SIR,—I have to apologise for allowing Mr. Bridgewater's reply to my former letter to pass unnoticed. That communication, however, does not in any way meet the points I have raised, nor the question how it happens that the Rev. Mr. Probert was so sensationally sanguine about the wondrous riches of the property of the Utah Mining Company, which before any returns whatever were made proved an utter fiasco. Will Mr. Bridgewater explain how it comes to pass that the Rev. Mr. Probert, after having publicly offered to make the Utah Mine a success, if he were only permitted to assume the management, refused to accept the position when the offer was made? Smelting the "enormous deposits of rich galena" was, according to Mr. Probert, the only salvation of the Utah Company. But the awkward question now is—Where is the ore? *Vide* Mr. Longmaid's letter in last week's Journal.

It is natural enough, no doubt, that Mr. Bridgewater should appear as the champion of Mr. Probert. As Mr. Probert's brother-in-law, no one can be better able to afford information upon this point than Mr. Bridgewater.

It will probably be in the recollection of some of your readers that about this time last year I was sadly abused by Mr. Postlethwaite and others because, in my simplicity, I ventured, as a shareholder, to take some exception to the financial policy of our board. Although since then some emendative steps have been taken, yet I still submit that the declaration of dividends by the anticipation of profits—for that is practically the case—is only a continuation of the policy I complained of last year.

At the recent meeting Sir Leopold Heath endorsed all that I had put forth 12 months since, and the explanations of the Chairman were, at least to my mind, anything but conclusive.

Dec. 8.

A SHAREHOLDER.

NEW QUEBRADA COMPANY.

SIR,—I must crave your indulgence to be allowed to offer a short answer or explanation of the letter which appears in last week's Journal from a correspondent at Southampton. He states that "he had ventured to seek for information from the fountain head, but had not been vouchsafed a reply." From this expression it would naturally be inferred that he had written to the company's office, and that the secretary had not answered his letter. I feel, therefore, called on to admit that I am the sole delinquent, and am bound to relieve a valued officer of the company from the implied censure, adding that I am sure that no shareholder ever applies for information who does not receive a courteous, even if not always a satisfactory, answer.

Your correspondent wrote to me, which he had frequently done before, for information, and I think he will admit, never previously without receiving an answer, which may have caused him the more to notice the absence of one on this occasion, which arose solely from extreme pressure on my time from other Venezuelan business, as well as Quebrada affairs.

I must, however, defend myself and co-directors from the charge of "broken promises" as regards a meeting expected to be held in October last. My friend, "An Original Shareholder," is rather in error as to any such promise. What was stated was that by the Articles of Association a meeting should be held in October, but that would tread so closely on the heels of the one then being held (in August), we promised that another should be held before the end of the year. This promise we are fulfilling, as within a few hours of the time when this letter will appear the shareholders will receive a report from the directors, with a notice convening a meeting for the 29th inst. It is somewhat later than we intended, but has been a little delayed to enable us to announce the gratifying intelligence that the termination of all litigation (a blessing which the New Quebrada Company has never previously enjoyed) is now *un fait accompli*.—*Moorgate-street, Dec. 11.*

FREDK. H. HEMMING.

THE NEW QUEBRADA COMPANY.

SIR,—I readily endorse every word written by "An Original Shareholder" in last week's Journal. I am afraid between the two boards that the Quebrada interest is to some extent being sacrificed to that of the Bolivar Railway. Rumour says that the Bolivar Railway board is in a fix, and cannot "come to time," but I think this should be no excuse why we should not know the particulars desired by "An Original Shareholder," which appear to me to be perfectly reasonable and just. I have for years supported Mr. Hemming, upon the conviction that half-yearly meetings were indispensable. Undue reticence in public companies is always undesirable, and in the present case I cannot but think reprehensible.

London, Dec. 8.

ANOTHER ORIGINAL SHAREHOLDER.

THE NEW QUEBRADA COMPANY.

SIR,—What we should do without the *Mining Journal* I am at a loss to think. Through its medium we ventilate our complaints, and publish our hopes and desires. I am not at present disposed to enter into the matter of "An Original Shareholder's" complaint, which appeared in last week's Journal, but I would adopt the same means to ask my old friend, Mr. Hemming, why he does not condescend to reply to his enquiries. I have every faith in our vice-Chairman, and feel confident that nothing will be left undone so far as he is personally concerned, but I would again remind him that the disaffection is being widely spread.

London, Dec. 8.

A LARGE HOLDER OF ORIGINAL SHARES.

[For remainder of Original Correspondence, see to-day's Journal.]

TERSDALE.—An important discovery of lead ore has been made here; in driving from the bottom of the shaft northwards (18 fms. from the surface) the vein has for 9 or 10 fms. been very much twinned, and exceedingly hard. It is now opening out easier, and is worth for ore (say) about 7*l.* per fathom—drift wide. The ore is 30 in. wide, nearly pure galena.

Meetings of Public Companies.

CRENVER AND WHEAL ABRAHAM UNITED MINES COMPANY.

The ninth ordinary general meeting of shareholders was held at the City Terminus Hotel on Thursday.—Mr. STRATTON in the chair. Mr. GEORGE H. CARDOZO read the notice convening the meeting. The report of the directors stated that in the last directors' report to the shareholders it was mentioned that the output of copper ore for two months amounted to 342 tons, whereas the five bi-monthly samplings since that time have amounted to 2380 tons, showing an average output of ore of 476 tons bi-monthly produce; the increase of the last returns of ore for two months over the corresponding months last year being 301 tons, amounting in all to 553 tons, instead of 253 tons. There is at present sampled on the mines tinstone worth about 2400*l.*, besides a considerable quantity of tinstuff, the value of which has not yet been ascertained. It is intended that the whole of this produce shall be sold as soon as made marketable, which the pneumatic stamps and calciner are rapidly doing in an economical and most satisfactory manner. At the present rate of working, without taking into consideration any probable increase, it is estimated that the tin at present price will yield upwards of 5000*l.* per annum. The discoveries of copper ore lately made in various parts of these mines have been numerous, and places formerly found unproductive are yielding copper ore on a remunerable scale. The remarks particularly apply to the course of ore opened up in the western portion of the mines, which being in whole ground are of great importance for the present, and show great promise for the future; at the same time the east has also improved, for where the lodes were productive the lodes have improved in quality and quantity, and in sinking Woolf's shaft the miners have gone through a considerable space, yielding 5 tons of rich copper ore to the fathom. At present the lode in the bottom of the shaft yields 1 ton per fathom, but there are indications leading to the belief that the lode will shortly give as much, if not more, mineral than before.

The Crenver and Wheal Abraham Mines are valuable property, and only require a little more time and development to make the receipts far exceed the costs. The liabilities and assets are nearly balanced, and the working capital nearly exhausted, consequently steps must be taken to obtain further capital. Everything indicates that the continued working of these mines will secure future profit and great advantage to the shareholders, and the directors hope that as others not so immediately interested have already offered to assist in raising additional capital, the general body of shareholders will see the advantage of taking up their proportion of such capital, which it is proposed to raise on terms authorised by the Articles of Association, and which will be found most advantageous to their interests.

The agents' report was read, as follows:—
Dec. 9.—Setting Report: Start's Engine-Shaft: We have put the men to take down the north side of the 225 fms. level, and think there is a lode standing in that direction; during the last 6 ft. of driving the lode appeared to be disordered. To drive the 225, east and west of shaft, by six men, the month, at 15*l.* per fathom; the lode is 1½ ft. wide, and will yield 1 ton of copper ore per fathom; this end has a kindly appearance, and we have no doubt but that the lode is standing to the south of shaft; we consider this to be a very good feature. To sink a winze in the bottom of the 215 west by six men, the month, at 20*l.* per fathom; the lode is 2½ ft. wide, yielding 1½ tons of copper ore per fathom; this winze is opening out what appears to be good tribute ground. To drive the 215, west of shaft, by eight men, the month, at 16*l.* per fathom; the lode is 3½ ft. wide, producing 2 tons of copper ore per fathom; the lode here is much improved, and letting out worked freely. To rise in the back of the level, against St. George's shaft, by eight men, the month, at 20*l.* per fathom; the lode is 3½ ft. wide, yielding copper ore to dress; we have about 3 fms. more to rise to communicate to the shaft, which we want to have done as early as possible to give better ventilation, and for the transit of copper ore. To drive the 200 east by two men and two boys, at 15*l.* per fathom; the lode is 2 ft. wide, occasionally yielding stones of rich grey copper ore, having a promising appearance. Crenver Shaft: To rise in the back of the 140, west of Harvey's rise, and east of shaft, by three men and three boys, the month or two, at 7*l.* per fathom; the lode is 3 ft. wide, worth 8*l.* per fathom for tin.—Bull's Shaft: To sink this shaft below the 180 by six men, the month, at 16*l.* per fathom; the lode is 1½ ft. wide, sometimes yielding stones of copper ore; the shaft is about 7 fms. below the level.—St. George's Shaft: The 203 to drive east on the south lode and west of shaft, by four men, the month, at 10*l.* per fathom; the lode is 1½ ft. wide, producing copper ore to dress; this end has opened up a large section of tribute ground; we have five pitches working in the back of this level by 18 men, at tributes varying from 5*l.* to 10*l.* in 1*l.*. We consider there is equally as good a lode in the bottom of this level as there is in the back, which we cannot yet work, it is not being drained. To drive the 190 east by six men, the month, at 12*l.* per fathom; the lode is 1½ ft. wide, yielding a little copper ore. To drive the 180, east on the south lode, and west of shaft, by four men, the month, at 8*l.* 10*l.* per fathom; the lode is 1½ ft. wide, producing a little copper ore, and has a very kindly appearance.—Woolf's Engine-Shaft: To sink this shaft below the 208 by nine men, at 32*l.* per fathom; the shaft is now about 10 fms. 2 ft. below the level; we consider it necessary to make this sinking 11½ fms. before commencing to drive east and west; the lode is 3 ft. wide, yielding copper ore to dress; this shaft has been sunk through a good piece of ore ground. To drive the 208 west, by two men and two boys, the month, at 13*l.* per fathom; we have not discovered any lode since passing through the cross-cuts. To drive the 120 cross-cut south by four men, the month, at 12*l.* per fathom; the ground here is much as it has been for some time past.—Vivian's Shaft: To drive the 220 east by six men, the month, at 12*l.* 10*l.* per fathom; the lode here for the last 5 ft. of drive has been disordered.—Pelly's Engine-Shaft: To drive the 243 west by eight men, the month, at 20*l.* per fathom; the lode is 2 ft. wide, producing a little tin, and good stones of copper ore. To drive the 243 east by six men, the month, at 13*l.* per fathom; the lode is 1½ ft. wide, yielding a little copper ore. To drive the 234 east by six men, the month, at 13*l.* per fathom; the lode is 1½ ft. wide, but principally spar. To drive the 243 east of winze, and west of shaft, by six men, the month, at 20*l.* per fathom; the lode is 5 ft. wide, and yields stamping work for tin.—Blewitt's Shaft: To drive the 234 west by six men, the month, at 7*l.* 10*l.* per fathom; the lode is 2½ ft. wide, producing good stones of tin; we are daily expecting an improvement here, as we are approaching the tin ground driven through in the 220.—Richard's Shaft: To drive the 220 west by six men, the month, at 7*l.* per fathom; the lode is 6 ft. wide, yielding 2 tons of copper ore per fathom—this is a strong, masterly lode; we have communicated to rise in the back of this level to Richard's shaft, which has given good ventilation; we have six men engaged in planking down the shaft from the 210 fm. level to the 220 fm. level. To drive the 210, west of Richard's, by six men, the month, at 7*l.* per fathom; the lode is 2 ft. wide, and yields copper ore to dress. To drive the 200 west, by six men, the month, at 8*l.* per fathom; the lode is 4 ft. wide, and will yield 2½ tons of copper ore per fathom; this end still looks well, and of course speaks well for the western part of these mines. To sink a winze in the bottom of the 200, west of shaft, by six men, the month, at 12*l.* per fathom; the lode is 4 ft. wide, producing 1 ton of copper ore per fathom. To drive a cross-cut north at the 180, west of shaft, by two men and two boys, the month, at 10*l.* per fathom; this cross-cut is 118 fms. west of Richard's shaft, and 50 fms. to the west of Williams's shaft; our object is to cut the north lode, which has not been seen below the 95, and we calculate we shall not have less than 20 fms. to drive to do it. To rise in the back of the 170, west of shaft, by six men, to hole to the 140, at 7*l.* 10*l.* per fathom; this rise is now up about 20 fms.; the lode in the rise is 5 ft. wide, and occasionally yields a little copper ore, and a great deal of mud. This rise is being put up to prove the piece of ground standing above, as well as for ventilation; at the same time it is directly under Williams's shaft, there being about 10 fms. of ground to rise through to communicate to the 140, and, if we are rightly informed, there are only about 10 fms. more from the 140 to the bottom of Williams's shaft; if this shaft were to be carried down to a 220 fm. level it would be a very great advantage to these mines. Since the last general meeting a considerable amount of work has been done here, both at surface and underground. On tutwork we have explored by rising, sinking, and driving not less than 673 fms. of ground, as per tabulated statement enclosed, and we have erected a pneumatic stamps and a calciner, laid out a large portion of the tin-floors, all of which is working satisfactorily, and, taking the mines throughout, they have never looked so well since they were drained.

—WM. THOMAS, JAMES HAMMILL.
The CHAIRMAN said the holding of the present meeting had been postponed till now for two reasons—the meetings which had usually taken place in September were so thinly attended, but the more important reason was because the mines were improving so much that the directors wished to see what the position of the company would be at a later period, when a larger number of shareholders might be present. The report of the directors fairly dealt with the state of the company at the present time, and informed the shareholders of the increase of the output of copper; in fact, the whole value of the mine had very much improved. At the last meeting a question was asked him whether the then two months' returns of 342 tons were likely to be maintained. He replied that they would be able to keep up that amount, and he believed it would be increased. From that period the amount had gradually increased, and the last sale, which took place last week at Redruth, and at which he took the chair, they sold 553 tons, which realised 2711*l.* At that meeting 16 mines were represented, but Crenver and Wheal Abraham was far above any of them. The whole amount realised by the 16 mines was 8722*l.*, of which Crenver and Abraham received 2711*l.* Last week he was several times at the mines—in fact, he was there for three whole days, and he could positively assert that beyond all doubt they possessed a most valuable property—a property which, although not in a paying state at the present time, yet he firmly believed that it would be in a perfect state in a very short time, for certainly no long time should elapse previous to its returning dividends to the shareholders. All the directors held a very large interest—between 8000 and 9000 shares; therefore, their interest was thoroughly involved with that of the shareholders in the endeavour to make the mines yield permanent dividends. They had come to the end of their capital, and it would be for the shareholders to decide how the further means could best be obtained, whether or not they would follow the advice of the directors, and put more money into the concern upon good security—the security of the mines, machinery, and plant. The interest would be thoroughly guaranteed in this way—that as the amount raised would be more than sufficient to carry out the necessary works and developments to place the mines in a paying state, a certain amount would be invested in Consols or otherwise. The sum proposed to be raised was 20,000*l.*; it was as well to raise a larger amount than absolutely required, and for this reason—there was a certain security to offer, and in offering that security they might as well get as large a sum as possible, and by investing a certain amount in Consols the interest

would be perfectly secure. He then moved that the report and accounts be received and adopted.—Mr. BARLOW seconded the proposition.

Mr. H. GREEN said the company was obviously insolvent, and enquired what proportion of the 7000l. arrears on allotments and calls could be considered really an asset. Instead of encumbering the machinery and plant as proposed the better course would be to voluntarily wind up the company.

The CHAIRMAN did not exactly see how the directors could say that any portion of the arrears was absolutely bad, but of that amount they were certain to recover at least 3700l. without difficulty.

In reply to further questions, the CHAIRMAN stated that the copper sold last week had not been included in the accounts now submitted—that was an asset, with a further cost as a liability. The item of 578l. had been written off to the forfeited share account; the call of 2l. per share was made not upon 50,000, but upon 49,500, the difference in the account was the calls actually made on them before forfeiture.

A SHAREHOLDER asked whether the sales of ore made last week by the mines referred to by the Chairman were bi-monthly?—The CHAIRMAN said they were mostly bi-monthly, West Tolgus excepted; this mine, formerly in a worse position than Crenver, recovered, a large amount of copper having been found, and it is now paying regular quarterly dividends.

A SHAREHOLDER would like to know the prospect there was of the returns over-taking the costs, which were now at the rate of 25,000l. per annum, as against 8000l.—The CHAIRMAN said, in mining operations the main thing to do was to find out whether they really possessed what they had been looking for, and to employ as many men as possible to open out the ground quickly. In a property like Crenver it would be very easy for them—if they carried on operations in that way—to have 150 men at work instead of 340, and at once bring the mine into a paying state, but more certain ruin could not possibly take place. If it took a year and a half to build a house, it would scarcely be fair to call that so much loss time, and here they were excavating ground in order to enable them to get out with profit that which, lucky for them, had been found near at hand, because in the west very large discoveries had been made, and it required a very small expenditure to put the mine into a thoroughly paying condition. He believed the mine to be perfectly capable of returning four times the quantity of ore at present being returned. He told them at the last meeting that the returns of 342 tons would not go down, and now he told them that 543 tons should not only not go down, but that the amount would progressively increase. They had a very large set situated in a highly metalliferous district, teeming with mineral, and it only required capital to bring those minerals to surface to make Crenver a very profitable concern.

Sir CHARLES WINGFIELD said unless it could be shown the receipts would exceed the working expenses the prospect of raising more money did not appear very encouraging.

The CHAIRMAN said when at the mine last week he made a calculation as to what was necessary to be done for the thorough and economic development of the mine. The stamps and floors required an expenditure of about 5000l. Pelly's engine-shaft required a new boiler, which would cost 2000l., by which a great deal of coal would be saved. A new cylinder was required at Williams's shaft, which would cost about 1000l.; and sundries for wire-rope, &c., about 2000l.; sinking Williams's shaft and providing pitwork, 2000l., by which a saving would be effected of 7000l. a year in labour, besides which Pelly's engine-shaft would be greatly relieved. The sinking of Sturt's shaft had been rendered necessary in consequence of a new lode having been lately discovered, since the report was issued. That new lode cost about 1000l., but the current expenses would be about 5500l. 0000l. to bring the mine into a thoroughly paying condition. He did not say the expenditure would be brought down to the receipts, but he believed he should successfully raise the receipts far above the expenditure. He knew the property well and its capabilities.

A SHAREHOLDER asked if it was to be assumed that the future costs would be 25,000l. a year?—The CHAIRMAN said he should think they would be 30,000l. for the next year, against which there would be returns of copper to the value of 16000l. to 18000l. per month, and tin to the value of about 4000l. per month.

Mr. MARSH (a director) mentioned that the current expenses so nearly approximated the returns that any discovery would at once make up the difference, and there were good reasons to believe they are on the verge of very great discoveries.

The CHAIRMAN said if the shareholders would put in a little more money he believed the shares would soon advance to par.

Sir CHARLES WINGFIELD said the shareholders were greatly indebted to the Chairman for the great attention he had given and time he had devoted to the company's affairs, but he should like to know what were the prospects of increasing the returns?

The CHAIRMAN said the expenditure of the amount now proposed would, according to the belief of those who were authorities in the matter, make it a good paying concern. As he had already indicated, they did not purpose to expend anything like the whole of the 20,000l., of it 5000l. would at once be put in Consols to meet the interest for two years.

Sir CHARLES WINGFIELD said he was rather disposed to support the proposition for the additional capital, especially if he could be satisfied as to the progressive increase of the returns.

Mr. HORACE GREEN, after some further discussion, moved (as an amendment to the adoption of the report), that the company be wound-up voluntarily.

Mr. WILKINSON seconded the amendment.

Upon being put three hands were held up in its favour, and a large majority against it, when the motion for the adoption of the report was put and carried.

Mr. RAWLINGS said it was clear that either the mine must be abandoned or the necessary capital supplied. He and his partner would endeavour to take some of the debentures, and he thought when opened out the mine would be a good and paying one.

Some discussion ensued, resulting in an understanding to leave the directors entirely unfettered, so as to raise the necessary money as in their estimation would be considered most advantageous to the interests of the company.

A vote of thanks to the Chairman and directors closed the proceedings.

ASSHETON MINING COMPANY.

An extraordinary general meeting of shareholders was held at the offices, Bartholomew House, on Monday, to consider, and, if approved, to pass, one or more of the following resolutions:—That it is absolutely necessary that funds be provided in some way to enable the operations at the mine to be continued. That the directors be empowered to provide the requisite funds, either by sale of a portion of the sett, or by the creation of further shares, on such terms as the meeting may direct. That the company be wound-up voluntarily under the provisions of the Companies Act.

Mr. W. NEWLAND RUDGE in the chair.

Mr. H. WILSON (secretary) read the notice convening the meeting. The directors in their report appealed to the shareholders to subscribe money on mortgage debentures; but, this appeal having been only partially responded to, they have no other alternative than to call a meeting of the members to discuss the position and prospects of the mine. Shareholders are earnestly requested to attend, as the present direction is, in the face of the want of confidence betrayed by the shareholders, anxious to be relieved of its responsibility.

The CHAIRMAN said the business of this meeting was not of a very pleasing character. The application for debentures was not responded to beyond 4000l. to 5000l. as far as the shareholders were concerned, although the directors and their personal friends had increased that amount to 11000l. The directors took the largest number of shares some time since at 4l. per share, and had otherwise financially assisted the company; but they could not continue to do so if the shareholders did not come forward and assist themselves. The directors now asked the shareholders to express their opinion as to the best means to be adopted to carry on the company. If the shareholders were inclined to assist the board they were quite prepared to perform their part, although they had privately advanced money to keep on the company. The value of the mine was beyond all question, and it was provided with valuable plant and machinery. It had been suggested that the best plan to obtain the necessary additional capital would be to dispose of a portion of the property, offering the present shareholders a *pro rata* interest. The Tan-y-Bwlch Mine, adjoining Assheton, had expended upon it by its private owners some 10,000l. before any remunerative returns were made, but the mine was now returning 100 tons of lead per month—at a distance of only 40 fms. from the Assheton boundary the lode in Tan-y-Bwlch was worth 1000l. per fathom. No doubt the ground between the present workings and the Tan-y-Bwlch boundary, although as yet undeveloped, would prove one of the best portions of the Assheton Mine, and if it were agreed to dispose of it the only conditions should be that the present Assheton shareholders should have the prior option of securing an interest. Unless some decision were arrived at to provide additional capital the alternative would be to pass the third resolution for the voluntary winding-up of the company. He then moved that it is absolutely necessary funds be provided in some way to enable the operations at the mine to be continued, and that the directors be empowered to provide the requisite funds either by sale of a portion of the sett, or by the creation of further shares, on such terms as the meeting may direct.

Mr. H. D. BROWN seconded the proposition. This resolution really provided the alternative of selling a portion of the mine to a new company, or raise the necessary capital by debentures. He had given the matter a considerable amount of thoughtful consideration, and, as a result, prepared a scheme for the disposal of a portion of the western ground to a new company. The difficulty was that as the best portion of the mine would have to be sold to another company, how could it be at the same time retained to the present shareholders? He proposed that they should be paid one moiety in shares and one in cash, by which an interest would be retained, while capital would be provided to work the entire property. His scheme was that the western ground should be sold to a new company for 7000l., to be paid 3500l. in cash, and 3500l. in 1l. shares, the latter to be allotted to the present Assheton shareholders as with 10s. per share paid. He proposed that the capital of the new company should be divided into 14,000 shares of 1l. each, and he thought there would be no difficulty whatever in placing the 7000 shares among the directors and their friends if the Assheton shareholders did not take them. The 7000l. thus provided would enable them to sink the shaft upon the valuable lode now being so successfully opened out in Tan-y-Bwlch, and the 3500l. paid in cash to Assheton proper would enable the liabilities—amounting to some 12000l.—to be cleared off, and the mine to be developed in the manner which its merits deserved. Both concerns could be carried on as one concern, with one direction and one manager—so that in this respect the expenses need not be increased to any appreciable

extent. They had corroborative testimony on all hands that by the present mode of working great riches could not be reached or success attained. The mine was being worked to a great disadvantage, but he believed by the carrying out of the scheme he had shadowed forth the entire mine would be properly and successfully developed, and the shareholders have a fair chance of seeing their property command a market value far different to that it now occupied. The directors were perfectly prepared to do their share if the shareholders would co-operate in the scheme, and they felt satisfied that by so doing substantial dividends would yet be received by the Assheton shareholders. (Hear, hear.)

Mr. W. GUNDBY (a director) submitted the following report:—

Dec. 4.—Greatly with your instructions, I have inspected this mine. The following is my report thereon. Mawr's shaft is sunk to the 50m. level on the course of the east and west lode, which has an underlie of (say) 20 in. in 1 fm. north; the character of the rock, blue clay-slate, and also the fissures passing through the same, is most favourable for the growth of ore in large quantities. The 50m. level is extended east 3 fms. in a large lode; the first few feet discovered a nice bit of lead ore cropping up out of the bottom; it looks like the top of a deposit of ore. The lode in the end is showing spots of ore only. The 50 is driven west 14 fathoms through a large lode, composed of quartz, mundie, blende, and lead, presenting a very pleasing appearance. The lode in the forebore is 6 ft. wide, with a mixture of blende and lead, saving work—a nice lode. From the indications here I think you will come on a good lode soon—the surrounding rock indicates it. I have a doubt on my mind that the main ore-bearing part of the lode is standing in the south side, which can soon be proved by a short cross-cut. The 40 west is driven 3 fms.; here the lode is divided by a horse of 3 fms. wide. The 40 east is driven a good distance, the first 13 fathoms on the north part of the lode, at which point a cross-cut was put out 8 ft. to the south part, which I call the main ore-bearing part of the lode; here a fine course of lead ore was discovered for (say) 13 fms. in length; it is now being stopped below the said level, yielding 1 lb. and 4 tons per fathom—on an average, I set it down at about 3 tons per fm. The water is being drained from the said stop by means of a hand pump. It is this part of the lode that I rather think is standing in the 50 below. Brown's shaft is west of Mawr's 56 fms., and sunk to the 40 under the lode. The 40 is driven west of shaft from 15 to 20 fms., and a good shoot of ore was laid open. The stop in the back of the said level is worth 1 ton of lead per fathom, with a mixture of blende. A cross-cut should be put out here to prove whether there is any more lode standing south just under the said stop. The 30 is driven west 26 fms.; at a point 3 fms. from shaft a good lode was discovered, and continued more or less ore for nearly 15 fms. in length; it is now being stopped below the said level, yielding 1 lb. and 4 tons per fathom. No. 1 winze has been communicated with the 40, which it appears went down on the north part of the lode, producing ore in paying quantities. In the bottom of the 30 a stop is at work about the said winze, where they have been engaged shooting out the south part of the lode, which so far as can be seen is looking well—worth 2 tons per fathom. I need not make any comment on the other old workings; but I am bound to say that it appears quite clear to me that you have a fine property if worked in a mine-like manner, but by the present mode of working the mine can never pay unless the vein proves more than ordinarily rich. You have been working the ore ground and wasting the ore before your eyes, and can be brought into play to use any economy. You are working underhand pumping water by manual labour, drawing and filling stuff two or three times over before it reaches the dressing-floors. You will distinctly understand me that I lay no charge to the agents; it appears to me that they have no choice in the matter. Ore must be got out if it cost 30s. to get 20s. worth, and by this mode of working I need not tell you that the company must come to grief. I strongly recommend you to stop all dressing for (say) six months, and prosecute the several bargains as below. The 50 west is six men. The 40 west is six men. The 30 west is six men. The 20 west is six men. The 10 west is six men. The 0 west is six men. The 50 east is six men. The 40 east is six men. The 30 east is six men. The 20 east is six men. The 10 east is six men. The 0 east is six men. The 50 south is six men. The 40 south is six men. The 30 south is six men. The 20 south is six men. The 10 south is six men. The 0 south is six men. The 50 north is six men. The 40 north is six men. The 30 north is six men. The 20 north is six men. The 10 north is six men. The 0 north is six men. The 50 level is six men. The 40 level is six men. The 30 level is six men. The 20 level is six men. The 10 level is six men. The 0 level is six men. The 50 shaft is six men. The 40 shaft is six men. The 30 shaft is six men. The 20 shaft is six men. The 10 shaft is six men. The 0 shaft is six men. The 50 pump is six men. The 40 pump is six men. The 30 pump is six men. The 20 pump is six men. The 10 pump is six men. The 0 pump is six men. The 50 engine is six men. The 40 engine is six men. The 30 engine is six men. The 20 engine is six men. The 10 engine is six men. The 0 engine is six men. The 50 boiler is six men. The 40 boiler is six men. The 30 boiler is six men. The 20 boiler is six men. The 10 boiler is six men. The 0 boiler is six men. The 50 furnace is six men. The 40 furnace is six men. The 30 furnace is six men. The 20 furnace is six men. The 10 furnace is six men. The 0 furnace is six men. The 50 chimney is six men. The 40 chimney is six men. The 30 chimney is six men. The 20 chimney is six men. The 10 chimney is six men. The 0 chimney is six men. The 50 road is six men. The 40 road is six men. The 30 road is six men. The 20 road is six men. The 10 road is six men. The 0 road is six men. The 50 gate is six men. The 40 gate is six men. The 30 gate is six men. The 20 gate is six men. The 10 gate is six men. The 0 gate is six men. The 50 wall is six men. The 40 wall is six men. The 30 wall is six men. The 20 wall is six men. The 10 wall is six men. The 0 wall is six men. The 50 floor is six men. The 40 floor is six men. The 30 floor is six men. The 20 floor is six men. The 10 floor is six men. The 0 floor is six men. The 50 roof is six men. The 40 roof is six men. The 30 roof is six men. The 20 roof is six men. The 10 roof is six men. The 0 roof is six men. The 50 door is six men. The 40 door is six men. The 30 door is six men. The 20 door is six men. The 10 door is six men. The 0 door is six men. The 50 window is six men. The 40 window is six men. The 30 window is six men. The 20 window is six men. The 10 window is six men. The 0 window is six men. The 50 lock is six men. The 40 lock is six men. The 30 lock is six men. The 20 lock is six men. The 10 lock is six men. The 0 lock is six men. The 50 key is six men. The 40 key is six men. The 30 key is six men. The 20 key is six men. The 10 key is six men. The 0 key is six men. The 50 handle is six men. The 40 handle is six men. The 30 handle is six men. The 20 handle is six men. The 10 handle is six men. The 0 handle is six men. The 50 screw is six men. The 40 screw is six men. The 30 screw is six men. The 20 screw is six men. The 10 screw is six men. The 0 screw is six men. The 50 nut is six men. The 40 nut is six men. The 30 nut is six men. The 20 nut is six men. The 10 nut is six men. The 0 nut is six men. The 50 bolt is six men. The 40 bolt is six men. The 30 bolt is six men. The 20 bolt is six men. The 10 bolt is six men. The 0 bolt is six men. The 50 washer is six men. The 40 washer is six men. The 30 washer is six men. The 20 washer is six men. The 10 washer is six men. The 0 washer is six men. The 50 gasket is six men. The 40 gasket is six men. The 30 gasket is six men. The 20 gasket is six men. The 10 gasket is six men. The 0 gasket is six men. The 50 seal is six men. The 40 seal is six men. The 30 seal is six men. The 20 seal is six men. The 10 seal is six men. The 0 seal is six men. The 50 plug is six men. The 40 plug is six men. The 30 plug is six men. The 20 plug is six men. The 10 plug is six men. The 0 plug is six men. The 50 pin is six men. The 40 pin is six men. The 30 pin is six men. The 20 pin is six men. The 10 pin is six men. The 0 pin is six men. The 50 nail is six men. The 40 nail is six men. The 30 nail is six men. The 20 nail is six men. The 10 nail is six men. The 0 nail is six men. The 50 screwdriver is six men. The 40 screwdriver is six men. The 30 screwdriver is six men. The 20 screwdriver is six men. The 10 screwdriver is six men. The 0 screwdriver is six men. The 50 wrench is six men. The 40 wrench is six men. The 30 wrench is six men. The 20 wrench is six men. The 10 wrench is six men. The 0 wrench is six men. The 50 hammer is six men. The 40 hammer is six men. The 30 hammer is six men. The 20 hammer is six men. The 10 hammer is six men. The 0 hammer is six men. The 50 pickaxe is six men. The 40 pickaxe is six men. The 30 pickaxe is six men. The 20 pickaxe is six men. The 10 pickaxe is six men. The 0 pickaxe is six men. The 50 shovel is six men. The 40 shovel is six men. The 30 shovel is six men. The 20 shovel is six men. The 10 shovel is six men. The 0 shovel is six men. The 50 bucket is six men. The 40 bucket is six men. The 30 bucket is six men. The 20 bucket is six men. The 10 bucket is six men. The 0 bucket is six men. The 50 wheelbarrow is six men. The 40 wheelbarrow is six men. The 30 wheelbarrow is six men. The 20 wheelbarrow is six men. The 10 wheelbarrow is six men. The 0 wheelbarrow is six men. The 50 cart is six men. The 40 cart is six men. The 30 cart is six men. The 20 cart is six men. The 10 cart is six men. The 0 cart is six men. The 50 horse is six men. The 40 horse is six men. The 30 horse is six men. The 20 horse is six men. The 10 horse is six men. The 0 horse is six men. The 50 cow is six men. The 40 cow is six men. The 30 cow is six men. The 20 cow is six men. The 10 cow is six men. The 0 cow is six men. The 50 sheep is six men. The 40 sheep is six men. The 30 sheep is six men. The 20 sheep is six men. The 10 sheep is six men. The 0 sheep is six men. The 50 pig is six men. The 40 pig is six men. The 30 pig is six men. The 20 pig is six men. The 10 pig is six men. The 0 pig is six men. The 50 dog is six men. The 40 dog is six men. The 30 dog is six men. The 20 dog is six men. The 10 dog is six men. The 0 dog is six men. The 50 cat is six men. The 40 cat is six men. The 30 cat is six men. The 20 cat is six men. The 10 cat is six men. The 0 cat is six men. The 50 bird is six men. The 40 bird is six men. The 30 bird is six men. The 20 bird is six men. The 10 bird is six men. The 0 bird is six men. The 50 fish is six men. The 40 fish is six men. The 30 fish is six men. The 20 fish is six men. The 10 fish is six men. The 0 fish is six men. The 50 insect is six men. The 40 insect is six men. The 30 insect is six men. The 20 insect is six men. The 10 insect is six men. The 0 insect is six men. The 50 plant is six men. The 40 plant is six men. The 30 plant is six men. The 20 plant is six men. The 10 plant is six men. The 0 plant is six men. The 50 animal is six men. The 40 animal is six men. The 30 animal is six men. The 20 animal is six men. The 10 animal is six men. The 0 animal is six men. The 50 object is six men. The 40 object is six men. The 30 object is six men. The 20 object is six men. The 10 object is six men. The 0 object is six men. The 50 thing is six men. The 40 thing is six men. The 30 thing is six men. The 20 thing is six men. The 10 thing is six men. The 0 thing is six men. The 50 person is six men. The 40 person is six men. The 30 person is six men. The 20 person is six men. The 10 person is six men. The 0 person is six men. The 50 place is six men. The 40 place is six men. The 30 place is six men. The 20 place is six men. The 10 place is six men. The 0 place is six men. The 50 time is six men. The 40 time is six men. The 30 time is six men. The 20 time is six men. The 10 time is six men. The 0 time is six men. The 50 quantity is six men. The 40 quantity is six men. The 30 quantity is six men. The 20 quantity is six men. The 10 quantity is six men. The 0 quantity is six men. The 50 quality is six men. The 40 quality is six men. The 30 quality is six men. The 20 quality is six men. The 10 quality is six men. The 0 quality is six men. The 50 value is six men. The 40 value is six men. The 30 value is six men. The 20 value is six men. The 10 value is six men. The 0 value is six men. The 50 price is six men. The 40 price is six men. The 30 price is six men. The 20 price is six men. The 10 price is six men. The 0 price is six men. The 50 cost is six men. The 40 cost is six men. The 30 cost is six men. The 20 cost is six men. The 10 cost is six men. The 0 cost is six men. The 50 profit is six men. The 40 profit is six men. The 30 profit is six men. The 20 profit is six men. The 10 profit is six men. The 0 profit is six men. The 50 loss is six men. The 40 loss is six men. The 30 loss is six men. The 20 loss is six men. The 10 loss is six men. The 0 loss is six men. The 50 gain is six men. The 40 gain is six men. The 30 gain is six men. The 20 gain is six men. The 10 gain is six men. The 0 gain is six men. The 50 debt is six men. The 40 debt is six men. The 30 debt is six men. The 20 debt is six men. The 10 debt is six men. The 0 debt is six men. The 50 credit is six men. The 40 credit is six men. The 30 credit is six men. The 20 credit is six men. The 10 credit is six men. The 0 credit is six men. The 50 asset is six men. The 40 asset is six men. The 30 asset is six men. The 20 asset is six men. The 10 asset is six men. The 0 asset is six men. The 50 liability is six men. The 40 liability is six men. The 30 liability is six men. The 20 liability is six men. The 10 liability is six men. The 0 liability is six men. The 50 equity is six men. The 40 equity is six men. The 30 equity is six men. The 20 equity is six men. The 10 equity is six men. The 0 equity is six men. The 50 interest is six men. The 40 interest is six men. The 30 interest is six men. The 20 interest is six men. The 10 interest is six men. The 0 interest is six men. The 50 dividend is six men. The 40 dividend is six men. The 30 dividend is six men. The 20 dividend is six men. The 10 dividend is six men. The 0 dividend is six men. The 50 bonus is six men. The 40 bonus is six men. The 30 bonus is six men. The 20 bonus is six men. The 10 bonus is six men. The 0 bonus is six men. The 50 commission is six men. The 40 commission is six men. The 30 commission is six men. The 20 commission is six men. The 10 commission is six men. The 0 commission is six men. The 50 fee is six men. The 40 fee is six men. The 30 fee is six men. The 20 fee is six men. The 10 fee is six men. The 0 fee is six men. The 50 salary is six men. The 40 salary is six men. The 30 salary is six men. 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FOREIGN MINING AND METALLURGY.

The aspect of the Belgian iron trade has become more sombre. No serious transactions have been reported, notwithstanding the concessions offered by the establishments which are the most in want of work. In Germany also the iron trade is suffering from considerable depression, and all hope of a serious revival in affairs is postponed to the end of the winter. Official tables which have appeared this week show that in October Belgium imported 61,396 tons of minerals, 9794 tons of rough pig, 167 tons of wire, and about 600 tons of iron of various descriptions. The aggregate imports of iron of various kinds into Belgium in the first ten months of this year amounted to 150,890 tons, or only 3414 tons less than in the corresponding period of 1873. As regards the export movement relating to the Belgian iron trade, it may be observed that in October Belgium exported 14,742 tons of minerals, 1625 tons of rough pig, 277 tons of wire, 6626 tons of rails, 2558 tons of plates, 10,112 tons of rolled iron of various descriptions, 902 tons of rails, 1060 tons of worked iron, &c. The aggregate exports of iron and pig from Belgium in the first ten months of this year were 231,549 tons, against 191,493 tons in the corresponding period of 1873, and 243,170 tons in the corresponding period of 1872. As compared with the first ten months of 1873, the exports of pig presented this year a diminution of about 8000 tons; but, on the other hand, the exports of rails exhibited an increase of 19,529 tons, while the exports of plates expanded to the extent of 6657 tons. The exports of Belgian iron to England attained in the first ten months of this year the somewhat important aggregate of 30,382 tons, or about 20,000 tons more than in the corresponding period of 1873. Among the other best clients of Belgium for iron may be mentioned the Low Countries, which took in the first ten months of this year 34,000 tons. Italy, which took 32,000 tons; France, which took 39,700 tons; and the Zollverein, which took 22,000 tons; Russia took 16,800 tons; Switzerland, 10,000 tons; Turkey, 6288 tons; and Brazil, 6390 tons. The value of the iron and pig exported from Belgium in the first ten months of this year presented an augmentation of about 520,000 tons, as compared with the corresponding period of 1873. Some contracts for stores and plant are about to be let by the Administration of the Belgian State lines.

There has been a sensible hardening in quotations for copper during the last few days. At Paris, Chilean in bars, delivered at Havre, has made 92½; ditto, ordinary descriptions, 91½; ditto, in ingots, 97½; English tough cake, 98½; and Corocoro minerals, pure standard, 92½ per ton. At Havre, Chilean in bars has brought 90½ to 93½; ditto, ordinary descriptions, 91½; ditto, in ingots, 96½ to 97½; ditto, Lake Superior, 98½ per ton. The quotation at Rotterdam for Drontheim has been 50 fl. to 52 fl.; and ditto, for Russian crown, 51 fl. The tin markets have not sensibly varied. At Paris, Banca, delivered at Havre or Paris, has brought 105½; Straits, delivered at Havre or Paris, 98½; and English, delivered at Havre or Rouen, 98½ per ton. At Rotterdam, Banca has brought 58½ fl.; and Billiton, 55½ fl. The deliveries of Banca in Holland in the first eleven months of 1874 amounted to 131,876 blocks, against 183,008 blocks in the corresponding period of 1873, and 94,317 blocks in the corresponding period of 1872. The stock on schedules in Holland, Nov. 30, was 87,839 blocks, against 51,900 blocks in the corresponding period of 1873; the unsold stock of the Dutch Society of Commerce was also 79,135 blocks, against 27,932 blocks at the corresponding period of 1873. There has been but little change in lead and zinc; the two metals have been supported with firmness, a circumstance which is largely attributable to the scantiness of disposable supplies. At Marseilles rolled Vieille Montagne zinc has brought 32½ per ton, with a discount of 3 per cent.

The French iron trade remains in a dull and lifeless condition. There is scarcely anything doing, and, consequently, nothing interesting to report. December is usually a quiet month in the French iron trade, and this is more than ordinarily the case this year. Official returns which have just appeared in illustration of the commerce of France for the first ten months of this year show that the imports of iron of various descriptions into France—and especially plates—have notably increased this year; on the other hand, the exports of iron of various kinds from France this year present a decline of somewhere about 19 per cent. The imports of iron minerals this year show an increase of 20,000 tons, the augmentation relating more particularly to minerals from the island of Elba. Quotations for iron remain generally the same upon the French markets, with a slightly downward tendency. The Pontgibaud Mines Company have been paying this week a dividend for 1873-74 at the rate of 2½ s. per share. The Epinac Collieries and Railway Company has also been paying this week a dividend for 1873-74 at the rate of 10 s. per share.

It is difficult to say anything interesting with respect to the Belgian coal trade. If prices are still maintained without variation, this is not done without some effort on the part of producers, as the requirements of consumption remain below the average, and some colliery proprietors, less privileged than others, are, it appears, disposed to propose a slight fall for January—a fall which would be accompanied by a reduction in the wages of working miners, after the example of what has been passing of late in England. The fêtes and the holidays at the close of the year, by stopping works of extraction, will allow stocks remaining at the pit's mouth to be disposed of. The commencement of January will bring with it either a continuation of present quotations, or a slight fall in those prices. As regards an advance in prices, there is no possibility of it. The imports of foreign coal into Belgium in October amounted to 55,137 tons, and those of the first ten months of this year to 341,586 tons, or 190,000 tons less than those of the corresponding period of 1873, and 180,000 tons more than those of the corresponding period of 1872. The exports of coal from Belgium in the first ten months of this year amounted to 3,205,681 tons, as compared with 3,582,750 tons in the corresponding period of 1873, and 3,911,182 tons in the corresponding period of 1872. The exports of coke from Belgium presented still less satisfactory results this year; thus, they amounted to 440,000 tons, against 700,000 tons in the corresponding period of 1873; a slight revival was, however, noted in the exports of November, as compared with November, 1873.

The French Minister of Public Works has published this week an official return, illustrating the production of mineral combustibles in France in the first half of this year. The total production of the six months is returned at 8,290,000 tons. In this total the basins of the Nord and the Pas-de-Calais figure for 2,800,000 tons; the basin of the Loire, 1,750,000 tons; the Alais basin, 850,000 tons; and the other basins combined together for 2,900,000 tons. Assuming that the production of the second half of this year is not inferior to that of the first half, it will be seen that the total production of the year will amount to 16,500,000 tons, or 16,600,000 tons. This latter total will about equal the production of 1873. The Nord and the Pas-de-Calais basins will probably, however, only produce 5,600,000 tons this year, while their production for 1873 amounted to 6,500,000 tons. The extraction of the new coal districts which have been opened out will make good the difference. It is expected that France will consume this year 6,000,000 tons more coal than she will produce; the department of the Nord has alone consumed one-third more coal than it has produced this year. The coalowners of the North of France appear, then, to have no just grounds for reducing a production which is, and which will long remain, insufficient. Whatever activity is given to the extraction the sale is assured with, perhaps, some slight sacrifices in prices. Notwithstanding cold weather, a slight fall in prices for domestic coal has for the time being prevailed upon the French markets. Industrial qualities have also been rather neglected.

COAL AND GOLD IN NEW SOUTH WALES.—The correspondent of the *Times*, writing from Sydney, says that coal is in the ascendant, and the affections of the speculators are transferred from gold. An important discovery of coal is made at Broughton Creek, near Shoalhaven river. A seam, 7 ft. in thickness, has been opened, and is not far from the railway station at Moss Vale. The following table exhibits an improvement in gold. It shows the Mine receipts of gold from the various gold fields only for the first eight months of 1873-74:—

	Western.	Southern.	Northern.
1873	172,240	34,464	6,556
1874	124,962	27,656	5,692

There is briskness about copper and tin mining, and more encouragement.

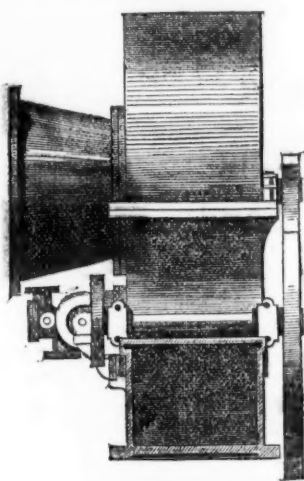
REVOLVING FURNACE FOR ROASTING ORES.

A new rotating furnace, the invention of Messrs. TEATS and BREED, of Cincinnati, Ohio, is at present being introduced in America for the roasting, desulphurising, chloridising, and oxydising of gold, silver, or other ores. It is built of light boiler iron, conical shaped ends, with cast-iron hollow throats, lined with common brick, laid flatwise. The furnace revolves on four adjustable wheels, as shown in the engraving, and is driven through a gear wheel secured in sections to the periphery of the furnace in such a way as to permit of its being removed and replaced without disturbing the brick lining. The driving pinion is on a counter shaft, on the other end of which are change gears, worked by a clutch moving on a feather; by this means the speed of the furnace can be changed from fast to slow, or it can be stopped by simply moving the handle of the clutch. At the front end of the furnace is a fire-box, 4 ft. long and 3 ft. wide, built of light iron, lined with brick, and arched with fire-brick. It is so constructed that it can be removed from the ash pit without disturbing its lining. At the back end of the furnace are dust chambers, built on pillars and in stories, so that the dust can be easily and quickly scraped down from one chamber to the other, and finally into the furnace, by means of a hoe. The interior of the furnace is provided with a sifting conveyor placed lengthwise with the furnace, composed of hollow cast-iron pipes and movable slotted plates fitted into the pipes in grooves. Each end of the furnace is provided with angle pieces, which, in connection with its conical shaped ends, assist in throwing the ore being roasted on to the conveyor, which moves it from end to end, thoroughly mixing and at the same time sifting it through the heated air. The conveyor, which forms the axis of the furnace, offers but slight obstruction to the free passage of the air currents. The furnace is charged through one or two doors, from a hopper resting on a beam scale for convenience in weighing. The ore is carried from the stamps to the hopper by means of a screw conveyor. Between the fire-box and the conical end of the furnace the throat is provided with a series of holes covered by a sliding ring.

By a movement of this the holes are opened, and such an additional amount of air is introduced as may be desired. Where the rear throat joins the flue to the dust chambers there is a hinged ring of cast-iron which, being opened, allows the removal of the furnace for repairs without displacing the masonry. Immediately above this ring is the revolving damper, which regulates the draft of the furnace. Under the arch in the rear is a door used to introduce salt or other material, and in taking sample tests from the furnace while in motion.

The furnace is heated with coal or wood, light wood being preferred. When hot it is charged and made to revolve slowly, so as to make as little dust as possible till the sulphur commences to burn, after which the speed may be increased to the maximum. After the sulphur is removed, or nearly so, if silver ores are under treatment, salt may be added, in quantity from 4 or 5 per cent. for low-grade ores, upwards. A few revolutions mix the salt thoroughly, after which the furnace should be run very slowly, and occasionally allowed to stand for several minutes till the ore is fully chloridised, which can be ascertained by test samples. A car is then run under the furnace, and the charge emptied into it in a few minutes by revolving the furnace rapidly. The furnace is then ready for another charge. The capacity of the furnace illustrated above is about 2 tons of gold or silver ore, and the charge is treated and the silver chloridised in from three to five hours. Some ores, containing a large percentage of zinc, lead, or other base metal, require as much as eight hours in chloridising. One man on each watch attends to the firing, charging and discharging of from five to eight furnaces, and one cord of wood per furnace for every 24 hours is sufficient in chloridising and roasting. The total weight of iron in each furnace, including hopper, dust chamber, plates, fire-box, &c., is about 7 tons, and it is stated in the "Mining and Scientific Press of San Francisco," wherein an illustrated description is given, that it is no more difficult or expensive to set up than ordinary machinery. It is claimed for the furnace that it is simple, and can be worked with less expense, and that it effects a greater saving of the precious metals at less cost than any other invention in use.

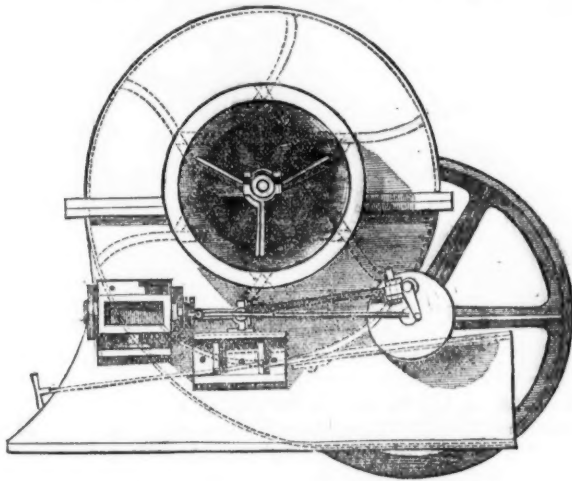
TEMPORARY VENTILATION OF MINES—PORTABLE GUIBAL FAN.



TEMPORARY VENTILATION OF MINES—PORTABLE GUIBAL FAN.

There are many cases in which the advantage of securing good ventilation temporarily and economically would be enormous, so that such a machine as the patent self-contained Guibal ventilator recently introduced by Mr. JAMES NELSON, of Sunderland, and Mr. D. P. MORRISON, of Newcastle, and of which the above are diagrams, will, no doubt, be extensively appreciated and adopted. The new fan has six vanes, and revolves on a horizontal shaft, within a cylindrical metallic casing, by which it is completely enclosed at the sides and circumference, with the exception of a circular aperture in the centre of one side, for the entrance of the air from the mine or place to be ventilated, and an outlet opening in the circumference, for the discharge of the air into the outlet chimney. The area of the outlet opening is regulated by an adjustable sliding shutter, according to the extent of ventilation required, and the outlet chimney is so constructed that it gradually increases as it leaves the fan, so as to reduce the velocity of the air at the point of discharge, and thereby prevent the loss of power that would occur in discharging it at the velocity of the fan. The outlet chimney forms the greater portion of the bed-plate of the ventilator, the remaining portion consisting of angle-iron of suitable form. Between one portion of the circumference of the fan-cylinder and the outlet chimney there is a short transverse shaft, carrying the wheel, which acts both as fly-wheel and driving-wheel, and is driven by a small horizontal engine, fixed by a wall-plate to the opposite side of the fan-cylinder. The necessary tubing being laid to connect the place to be ventilated with the inlet opening of the fan, the whole is ready for work.

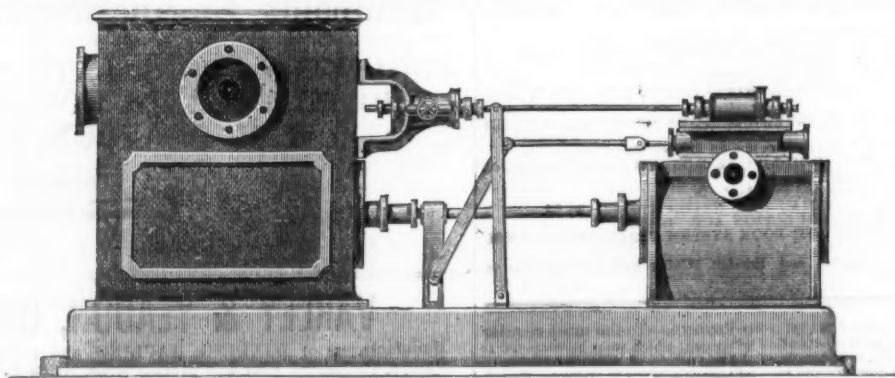
With regard to the power of these portable fans, it is found a ventilator 2 ft. 6 in. in diameter and 12 in. wide, with its 3-in. cylinder, will deliver from 5000 to 10,000 cubic feet of air per minute according to the condition under which it is working; the next size, 4 ft. diameter and 18 in. wide, which has a 6-in. cylinder engine, delivers from 7500 to 15,000 cubic feet per minute; and the



still larger ventilator, 5 ft. diameter and 2 ft. wide, worked by a 9-in. cylinder engine, gives from 10,000 to 25,000 cubic feet per minute. It will be seen that the engine and gearing are combined, and that the ventilator is self-contained and requires no fixing, erecting, nor brickwork; it is, therefore, applicable to a vast number of useful purposes. Being portable they will prove most valuable adjuncts to any mine, as they can be moved to any shaft, drift, or district workings, and can be driven by water, compressed air, tail rope, or steam. Where large volumes of air are permanently required, the useful effect is better from ventilators of larger dimensions, and small quick running fans cannot compete with them in duty. These are specially manufactured and designed for places where the ventilation is light, or where a temporary current is needed, either separately or in conjunction with other ventilating mediums. It is available either for exhausting or propelling air; and, applied with air-tubes or other bracing, is of the greatest utility in sinking shafts, driving headings, or as an auxiliary to existing means of ventilation in any distant or separate part of the workings.

As about 150 of the Guibal ventilators are in operation, or in course of construction—one of them 36 ft. diameter and 12 ft. wide, worked at 44 revolutions per minute, yielding 243,770 cubic feet of air, water-gauge 1-9, and guaranteed for 3-6 water-gauge, with 60 revolutions per minute—the general character of the Guibal ventilator must be well understood; but it may be mentioned that experience has proved that it requires but very few repairs, and does excellent work, whilst the total cost of the fan, with engine and connections, is only about one-third that of an ordinary ventilating furnace for producing the same amount of ventilation. A comparison of actual working between the furnace and the fan at a colliery in the North of England showed that with a consumption of only two-thirds as much coal the fan supplies nearly double the amount of air obtained with the ventilating furnace. No direct experiments seem to have been yet made with the portable ventilator, but there is no reason to suppose that the results obtained with it will be less satisfactory than those which have been given by the larger machines on the same principle.

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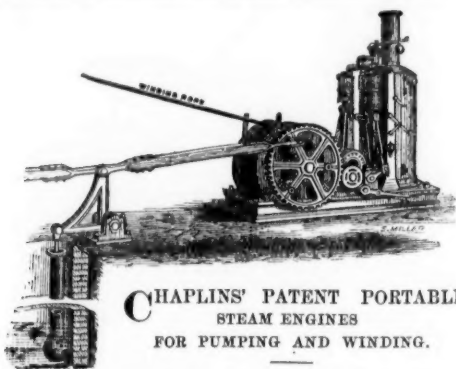
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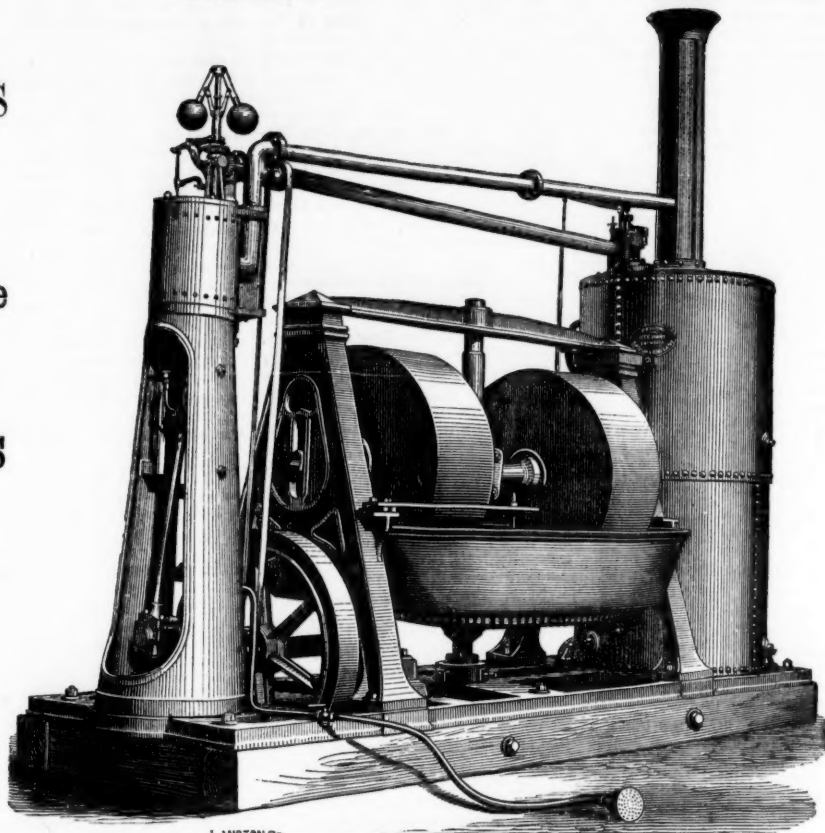
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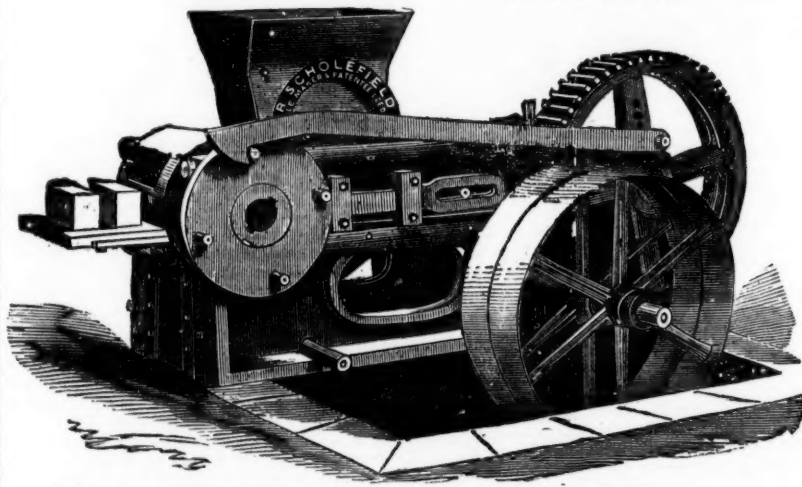
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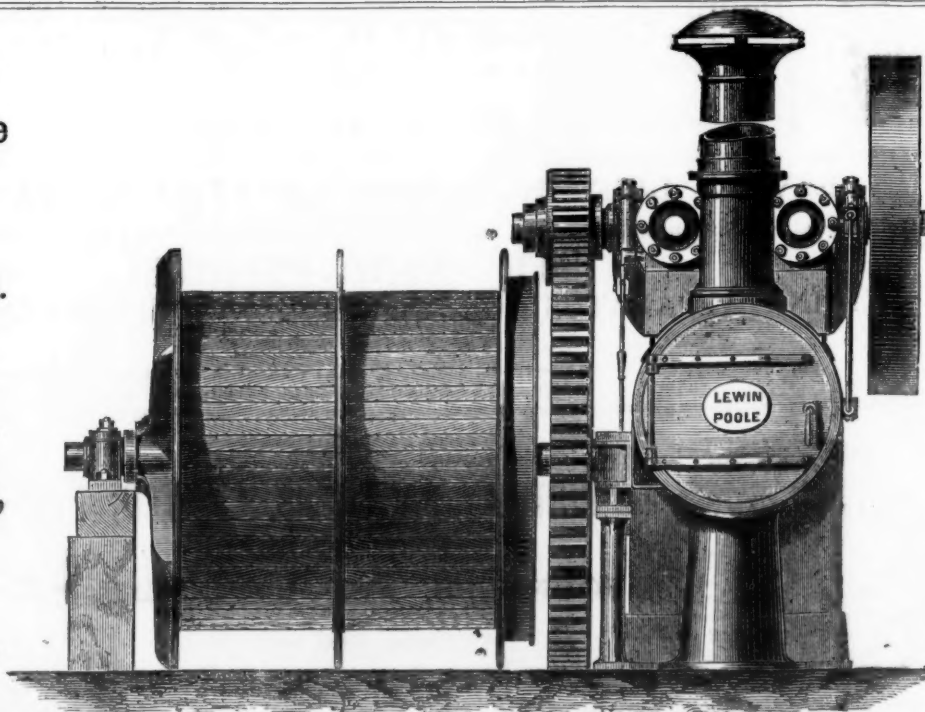
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